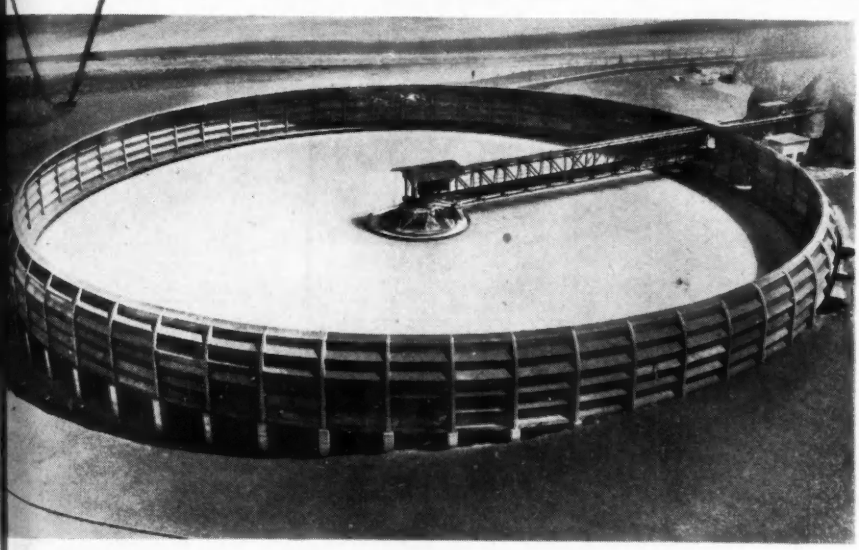
The Chemical Age

VOL LXVII 13 SEPTEMBER 1952 No 1731



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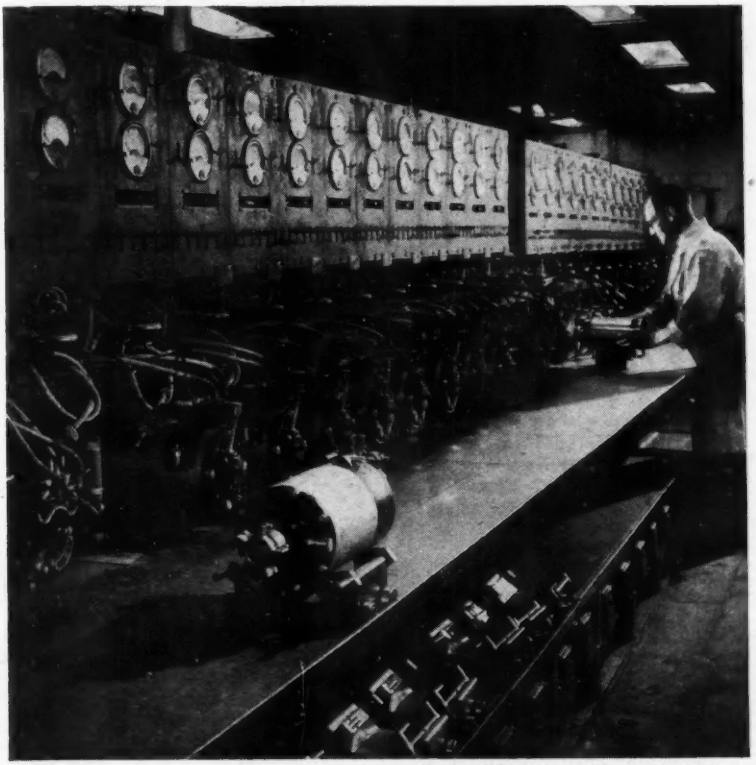

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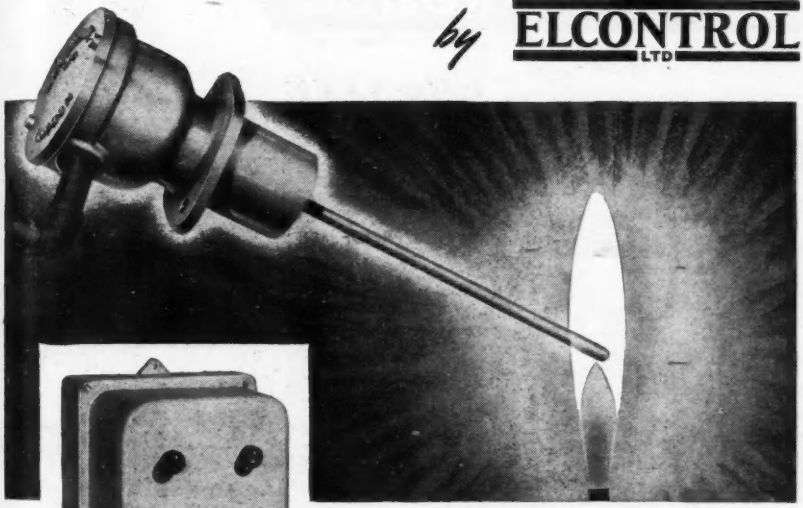

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The Last Word?

THE Anglo-American Council on Productivity has published its final report—indeed, this is the title selected for it, an emphasis of the fact that the Council's activities have ended with E.C.A.* It is encouraging to learn, however, that the British section will continue to exist for the time being as there are still a number of team reports to be published and the 'follow-up' work arising from the 47 reports already issued is by no means completed. Ultimately it is hoped that these responsibilities will be taken over by the proposed British Productivity Council.

These plans seem eminently sensible. Since the late Sir Stafford Cripps and Mr. Hoffman created the Council in 1948, the industry of the United States has been 'at home' to British experts and the various team reports have left no doubts about the generous full-heartedness of American hospitality. The everyday metabolism of American factories has been openly displayed. If that part of Anglo-U.S. co-operation has come to an end, our part here is hardly begun. What matters most is not what the various teams have seen and reported, but the speed with which desirable ideas and practices can be put into operation on this side of the Atlantic. For some years to come there must be an active British organisation fostering the distribution of the Reports, encouraging all means of spreading the information contained in them, and, above all, stimulating their practical application. The powers of such a body might be small and indefinable. It would, for example, have less direct contact with an industry or branch of industry than the relevant trade association yet it would have great influence—as a guide and a pace-maker. The Government was not niggardly in granting funds for the U.K. section—over the whole period £172,000 out of the total of £343,000 was allocated by the Treasury. It is to be hoped that similarly adequate backing will be given for the work that still remains.

The chemical industry does not figure too prominently in this final report from the Council. This however, is more apparent than real. The most important report—for the Heavy Chemicals team—is one of those still to be issued for the visit took place as recently as this spring. (Indeed, the itinerary of this tour is given in detail in the Report as a typical example.) The two most directly chemical reports so far published—Fertilisers and Pharmaceuticals—have not achieved

* This publication can be obtained from the Council's U.K. address, 21, Tothill Street, London, S.W.1., 3s. 6d. post free.

impressive circulation figures yet, 5,898 and 5,688 respectively. Only the brush industry report has shown lower figures, which is understandable enough for an industry of such specific limitations. Perhaps one explanation is the comparatively low man-power usage of the chemical industry. But metallurgy, which can hardly be classified as non-chemical, shows up much better—the Non-Ferrous Metals report has reached a circulation of 10,252 copies.

A point of some importance made by the Council deals with the difficulties that must be faced today when measures of increased productivity are considered. Heavy taxation, limitations on capital expenditure, fears of trade recession—and uncertainty in the steady supply of raw materials. There is the rub. Are we not too concerned with productivity for manufactured goods and much too little concerned with productivity for raw materials? Of the 66 teams that have visited the United States only five or six have been reasonably describable as dealing with raw materials. This is not an adequate ratio. There have been 19 'specialist' teams—covering such general aspects of industry as packaging, materials handling, plant maintenance, etc. There has not been a team of experts to cover mineral prospecting or mining. The only field of this kind that has been covered has been a negative one—Saving Scarce Materials. Yet it was no secret in 1948 or 1949 that the world's production of manufactured commodities had steadily outstripped progress in the production of basic materials. In this respect the United States—a much vaster territory—is far better endowed than the United Kingdom. But is it enough to call this a natural fact and leave it at that? The United States has had to locate all her raw material wealth, often out of necessity. Here we might have learnt much more while the opportunity of liberal interchange of knowledge and experience existed. Is it now too late?

A notable tribute to the technical press is paid in the Council's report. The Committee for Economic Information quickly appreciated the important rôle that technical journals could and should play in spreading information. A panel of publishers and readers of the U.K. technical and trade press was set up. One of the obstacles was the limitation of paper supply—and the easing of this shortage in the last year or so has increased the contribution of these journals. It is to be hoped that this tribute is not quickly forgotten. Paper is still one of the world's precarious materials and acute shortage could easily return again. The technical press consumes only a minute proportion of the paper used in Britain every year, but cuts on a basis of equalitarian rationing reduce its national value disproportionately.

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Notes & Comments

Chemical Trade Recession?

THERE is considerable evidence that recession in demand for chemicals began to demonstrate itself round about April this year. *The Financial Times* (26 August, 1952) regards this fall in trade as a delayed consequence of recession in other industries that sell more directly to the public. Contraction has been particularly marked in dyestuffs, other auxiliary chemicals for textiles, and raw materials for synthetic fibres. That an appreciable and general lessening of demand for chemicals has occurred will not be doubted by previously harassed consumers of sulphuric acid. Once again this single substance has acted as the industry's weather-vane. During this summer the arduous conditions of scarcity have eased remarkably—in part a reflection of economy in usage, in even greater part a reflection of generally lowered production. Some large users who only last year were desperately seeking new sources of acid now have surplus acid to offer; or so we are told in the gossip that follows chemical gatherings. The Board of Trade's monthly trade and navigation reports provide very definite evidence of recession. If the period considered is the first seven months of the year, i.e., up to 31 July, a substantial jump in chemical exports is shown. In sterling money value these are the figures for the last three years for this period:—

1950	..	£56,605,810
1951	..	£78,906,816
1952	..	£86,135,723

This might seem to demolish the recession theory, but a quite different story is told by the figures for July only:—

1950	..	£9,328,015
1951	..	£12,489,909
1952	..	£10,358,662

Here is a very marked contrast in the national accounts. Seven month's trading shows an average that has risen from about £11 millions to £12 millions—but the seventh month shows a fall from more than £12 millions to £10¼ millions. During the last few months of 1952 chemical exports have dropped sharply.

Transporting Liquid Sulphur

A NEW and ingenious departure in sulphur handling is being worked out in the United States (*Chemical Week*, 1952, **71**, 8, 65). Frasch-mined sulphur emerges from the domes in a molten state; when it is subsequently used for making sulphuric acid it is again required in liquid form. Why not, therefore, keep it molten? For some time there have been experiments of limited scope in which insulated tank-cars have been used and even in journeys lasting as much as three weeks it is said that the initially molten sulphur has remained liquid. This pioneer work would seem to have been done mainly by the acid-making consumers. Its success led, however, to larger-scale experiments by one of the major sulphur producers, who introduced a barge carrying a huge insulated tank for carrying molten sulphur to a central storage site ten miles from the mine. More of these barges are being constructed and they will carry sulphur for 40 and 75 mile trips. The acid-makers are likely to borrow this extension of their own original idea. A barge has recently been launched that will transport 1,000 tons of molten sulphur every other day from Texas Gulf to Houston, a 60-mile trip. It is believed that 300° F. temperature can be maintained in the tank of sulphur. Insulation by such materials as fibre-glass is only one part of the heat preservation story. Sulphur is itself an excellent insulator—the solidifying starts on the outside surfaces and this skin or scale that is formed makes an important addition to the existent insulation round the tank. This rapidly expanding development will do more than reduce handling costs for American acid-makers. It will ease production costs for more remotely situated Frasch-mined domes.

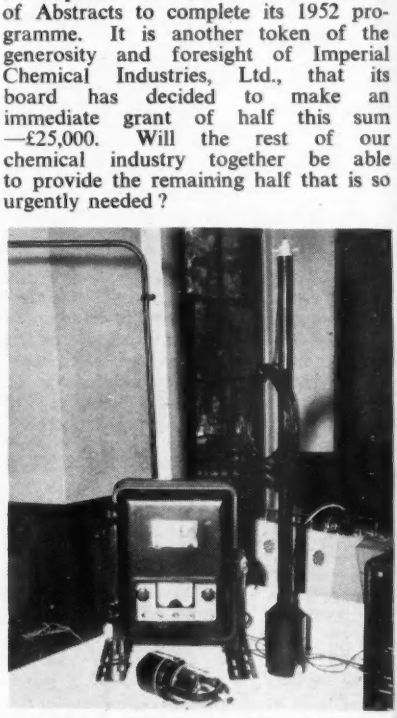
No Abstract Matter

IT is exceedingly unfortunate that *British Abstracts* should be facing a desperate financial crisis at a time of national economy. Nevertheless, it will be catastrophic rather than merely un-

fortunate if adequate official help is withheld or delayed. At a recent meeting of the Parliamentary and Scientific Committee, it was stated that something must be done to help with finance by the autumn or *British Abstracts* will cease to appear. We have no reason to suppose that this was an alarmist statement for it came from a scientist whose connection with society publications is both intimate and mature. There is a Treasury grant of £20,000 a year that is administered by the Royal Society, but this sum is devoted entirely to journals that publish new work in fundamental science. It does not assist applied science journals nor any publication that abstracts papers, whether pure or applied. However, the whole of the £20,000 would be of little help to *British Abstracts* today. The annual deficit over the next three years is £120,000 per annum! All the literature that is produced on the responsibillty of the Societies now costs £185,000 a year. On the credit side, members' contributions and purchases bring in £37,000; and sales to non-members produce £58,000. There is an annual loss running at the severe rate of £90,000. To this must be added another deficit of £30,000 covering arrears in indexing past volumes.

I.C.I. Gives Lead

AN objective critic might point to the possibility of increasing the receipts from sales to non-members, particularly abroad. The answer here is that unless *British Abstracts* can be put on its feet as an economic unit, it cannot hope to compete successfully with the similar U.S. publication, *Chemical Abstracts*. Immediately, a sum of £50,000 is required to enable the Bureau of Abstracts to complete its 1952 programme. It is another token of the generosity and foresight of Imperial Chemical Industries, Ltd., that its board has decided to make an immediate grant of half this sum —£25,000. Will the rest of our chemical industry together be able to provide the remaining half that is so urgently needed?



A symposium on electronic instruments was held by the Scientific Manufacturers' Association in London, on 2 September. On the left is a Kelvin Hughes Supersonic Flaw Detector. The transmitter probe directs a supersonic wave beam in the form of pulses of short duration and if the sample is sound the propogation is only reflected by the base of the material. On the right is shown a Model 28 industrial pH transmitter especially designed for the automatic control of pH in chemical manufacturing processes and the control of effluent.

The British Association

Summaries of Papers Read at the Belfast Meeting

THE 114th annual meeting of the British Association for the Advancement of Science, at which there was a record attendance, was concluded in Belfast on Wednesday, 10 September.

Following the presidential address by Professor W. Wardlaw (reported in last week's issue of THE CHEMICAL AGE, **67**, 319), a number of interesting papers were delivered to the Chemistry Section (Section B).

Since the war the perspective of progress in physical and inorganic chemistry has shown signs of change and a survey of the dominant trends of the present with possible future developments was given by Professor A. R. Ubbelohde, F.R.S., in his address on 'Advances in Inorganic and Physical Chemistry'.

A noteworthy feature, said Professor Ubbelohde, was the rapid growth of chemical physics and of mathematical chemistry which might help to supplement new generations of 'classical' physicists, many of whom divert their energies to nuclear science.

In physical biochemistry developments included the way in which widely diversified techniques were now applied to the study of a complex problem such as the behaviour of water molecules in proteins. A crude but highly suggestive model of a mechanism of adaptation to environment had been developed as a result of physico-chemical studies of bacterial cell growth.

The economic development of radioactive tracers in applied chemistry had shown that their application in research and industry required intensive training.

Radiocatalysts Possible

A more speculative but intriguing use of radio chemistry lay in the possible development of cold or radiocatalysts for industrial chemistry. Systematic physico-chemical surveys of the main field of applied chemistry were being studied by more than one research association.

Two main problems had to be considered in the question of education, continued Professor Ubbelohde. These were how to produce truly versatile and adaptable physical chemists capable of becoming the leaders of the future, and how to guide the non-chemical education so as to ensure a balanced activity in the world. Chemists also occupied a central position in the ranks of education when it came to adding scientific elements to an advanced non-technical education.

'Fibres, Old and New'

With the increasing availability of synthetic fibres will the natural fibres become outmoded? This was the question raised by Dr. D. W. Hill, deputy director of the British Cotton Industry Research Association in his paper introducing a series of discussions on 'Fibres, Old and New.' It was improbable, however, he thought, to say the least, that an ideal fibre suitable for all purposes would ever be discovered.

Origins of textile manufacture were lost in antiquity. Before history began men had discovered the secret of twisting fibres together and interlacing the resultant yarns to produce strong and flexible coverings.

In view of its enormous importance it was not surprising that the world had been combed for raw materials for the textile industry. The animal world yielded wool, horsehair, mohair, alpaca, and silk. From the vegetable world came cotton, linen, and flax. The mineral world gave asbestos, gold, silver, copper, iron and glass, all of which could be converted into fibrous form.

The rayon industry might be said to have started in 1899 with a patent by Cross and Bevan, who had discovered that cellulose could be dissolved in a mixture of caustic soda and carbon bisulphide to produce viscous solutions from which the cellulose could be readily regenerated after drawing out into fibres. From the success of the first regenerated fibre had sprung many others, including Ardil from groundnut protein, alginate fibre from seaweed, and Lanital from casein.

One of the important features of viscose rayon was that it was a discovery of an empirical nature. The essential properties of fibres—those to which they owed their value for textile purposes—were mechanical properties such as strength and elasticity.

In the 19th century chemists had not regarded these properties as coming within their purview. At the time when the production of viscose rayon was a fully developed industry the modern theory of the structure of textile fibres was unborn. The conception of the cellulose molecule as a very large number of glucose units combined with one another by glucoside-like linkages to form a long thin chain was neither widely known nor generally accepted.

The study of synthetic linear polymers, of which the constitutions were known, provided the key to the problem in that it introduced the conception of average molecular weight in place of the previously accepted constant molecular weight, together with relationships between viscosity and average chain length which were independent of chemical transformations.

Obstacle and Solution

One well-known phenomenon had proved to be a considerable obstacle to the acceptance of the molecular chain theory, for if cellulose consisted only of identical glucose units identically linked, there appeared to be no reason for supposing that the conditions which produced rupture of some bonds would not produce rupture of all of them. Fortunately the application of X-ray studies to the problem of fibre structure provided a solution. The X-ray studies also offered an explanation of the strength of textile fibres and opened up a method of increasing it and of changing the chemical reactivity.

According to the modern view the strength of a fibre is determined not by the strength of the glucoside-like linkages but by the secondary valencies or hydrogen bonds holding the crystals in a regular pattern.

The climax of the study of fibre structure was reached in the decade following 1928. In that year a long range fundamental study was initiated in the Du Pont Laboratories under the brilliant direction of Dr. W. H. Carothers, which produced in 1931 the announcement of what amounted to a specification for the production of fibres from synthetic polymers. This stated that for fibre-forming properties a polymer must have a molecular weight of not less than about 12,000 and a molecular length of not less than 1,000 Å; it must be capable of crystallising, and three-dimensional polymers were unsuitable.

A vast search began for synthetic polymers which could be converted to commercially valuable fibres. Nylon, therefore, had been succeeded by others, including Perlon, Orlon, Vinyon and Terylene (discovered in 1940 by Whinfield and Dickson working in the research laboratories of the Calico Printers Association and now being actively developed by Imperial Chemical Industries). The adventure of fibre structure was one of the greatest and most comprehensive narratives of the century.

The rayon industry had grown from a production of 2,000,000 lb. a year in 1900 to 3,500,000,000 lb. in 1950, while synthetic fibres had increased from 2,000,000 lb. a year in 1938 to 150,000,000 lb. in 1950, yet cotton and wool had also expanded their usage during the century.

Modern theory had enabled fibres to be modified to meet more exactly the demands made upon them. Introduction of rayon had produced a social change comparable in its effects with the Industrial Revolution. It was not a wild guess that nylon, Terylene and other synthetic fibres were destined to bring about another.

Synthetic Polymer Fibres

Speaking on 'Synthetic Polymer Fibres,' Dr. Rowland Hill, of the Imperial Chemical Industries, Ltd., Terylene Council, said that knowledge of the intrinsic physical properties of synthetic polymer fibres was now well established, but the factors affecting their textile character were still somewhat obscure. Research in the future would tend to be increasingly devoted to the relation between the fibres and their fabric forms and to the problems of designing and processing which they presented.

To make any attempt to forecast how far and how big synthetic fibres would grow would be sheer speculation, but the vast investment costs required for plant and the availability of raw materials would inevitably be increasingly important factors.

Where natural fibres or rayon were displaced, fibres would then become available to meet the increased demand of an expanding population and the high standards of living which arose from the world's material progress. The birth of a structurally new fibre of merit and distinction was rare, however, and was becoming increasingly less likely.

The huge costs of discovering, developing and establishing a new fibre were not gener

ally appreciated. One of the largest American nylon producers had spent $45,000,000 on research alone, $21,000,000 on commercial sales campaigns, and $196,000,000 on plant and facilities. The new British plant for Terylene, on which a start was being made, would cost £10,000,000.

A survey of the natural fibres, with special reference to their economic importance and their chemical and physical structure and properties was given by Dr. A. J. Turner, C.B.E., director of the Linen Industry Research Institute, Lambeg.

Despite the vast increase of man-made fibres in recent years which had played an important part in supplying the growing need of textiles to an increasing world population, 87 per cent of the production still came from natural fibres. Of this cotton still remained the primary contributor with 48.6 per cent; bast and leaf fibres were responsible for 24.4 per cent and the remaining 14 per cent came from animal fibres.

Production of the world's textiles was still largely a matter of agriculture so far as the raw materals were concerned. Much human labour had been and still was devoted to this production, in spite of modern mechanisation. Moreover, the original wild naturally occurring fibres were mostly deficient in the qualities that were economically worth while; they had been improved out of all recognition by the occasional genius with a gift for selecting and breeding.

Trends in Research

Research continued today in greater measure than ever, to produce new varieties and strains, with improved yield and quality and disease-resistance; and extensive agronomic experiments were directed towards improving cultivations. There would indeed be only a minute production of the natural fibres but for the intervention of man. In fact, while it was generally realised that the man-made fibres were a consequence of man's control of physical forces, it should not be forgotten that the abundance of natural fibres was no less dependent on man's control of biological forces.

Man's fundamental needs were food, shelter and clothing, and the world's greatest problem at the present time was their provision for its rapidly expanding population, said Dr. A. R. Urquhart, research superintendent, Lansil, Ltd., in opening his survey of the natural polymer fibres.

Of these needs, food was admittedly of primary concern, but the question of clothing was by no means negligible. The natural polymer rayons were making an effective contribution to the total stock of textile materials. Could they do more ?

All the regenerated cellulose and acetate rayons were, or could be made from woodpulp, and it was desirable to dispose of the impression, which was inclined to persist, that the world's forests were being denuded to provide pulp for paper and rayon. While there had been a period when cutting had at times been indiscriminate, most countries had learnt their lesson and felling was now fairly adequately controlled.

It might be assumed that increasing demands for textile fibres could be largely met by continued expansion of the industry. On the other hand it might be argued that the rayon industry could help in the major problem of food shortage.

Food More Important

The protein fibres were made from raw materials that were normally used as foods, and it might therefore be legitimately asked whether this kind of activity was justified in view of the food position. Little objection could be raised at present, however, because in most cases the raw materials used were not fit for human consumption.

Yet a serious attack on the food problem might force an alteration in production methods which would result in the materials becoming available as food either for ourselves or for food-producing animals. If such a situation were to arise then obviously the desirablity of expanding or even of continuing the production of fibres from edible protein would have to be reconsidered.

There was a possibility that the rayon-producing industries might be able to offer more direct help in the event of the food situation being tackled on a world-wide scale, which was the only scale on which it was likely to be solved. The natural fibres of which Dr. Turner had spoken were produced in the temperate and warm regions of the world—that was, in the regions that must be relied on for the production of food. But the manufacture of regenerated cellulose and acetate rayons from wood pulp allowed a new area to be utilised for fibre production

—the Arctic and sub-Arctic forest regions—and there was no competition with food production there.

A concerted attack on the food problem might therefore, involve a reduction in the quantity of natural fibres used in the textile industry, and their replacement by fibres based on wood-pulp. In our present state of knowledge this would undoubtedly mean a reduction in our clothing standards, but if humanity were faced with a reduction in either food or clothing standards there was little doubt which it would choose. There was an irreducible minimum in the food requirement below which the need for clothing would disappear.

The rayon industry was only about 50 years old, and phenomenal advances had been made in that time. It could well be that in the not too distant future quite a large measure of substitution might be possible without any reduction in standards at all, at least as far as the cellulosic fibres were concerned.

Chemical Engineering Stressed

Recognition of the increasing importance of chemical engineering was emphasised by the inclusion for the first time in the Engineering Section (Section G), of a session devoted to Chemical Engineering in Industry.

The need for more chemical engineers and their vital rôle in industry was the theme of papers presented by Professor D. M. Newitt, F.R.S., Courtauld Professor of Chemical Engineering, Imperial College, London, and Dr. E. H. T. Holbyn, director of the British Chemical Plant Manufacturers' Association.

Opening the discussion which followed Sir Harold Hartley, F.R.S., past-president, Institution of Chemical Engineers, appealed for greater recognition of chemical engineering—'the fourth primary technology'—which was complementary to, but not in competition with the older technologies.

There was an idea, continued Sir Harold, that chemical engineering was all chemistry, but when the chemical engineer took over basic research from the laboratory, the design, like other problems in engineering, was based mainly on classical physics. With chemical engineering there was a danger that through the lure of electronics and nuclear physics classical physics might become extinct.

The importance of chemical engineering as a technology lay in the adaptability of the chemical engineer, which was his strong suit. He had to turn from one technique to another, and for that a special training was necessary.

Visiting the universities, Sir Harold said, he had found that methods of training varied considerably. In America there was a division devoted entirely to chemical engineering with the training given by teachers of chemical engineering, and in that way they probably got the maximum efficiency from the large amount of ground to be covered.

At some universities in Britain there was still being taught what he regarded as an extinct subject—chemical technology. This had had its place 50 years ago, but it was no substitute for chemical engineering today.

In the U.S.A. too the chemical engineer enjoyed a greater status than in Britain. It was the chemical engineer who co-ordinated the activities of the civil, electrical and mechanical engineers in the big construction companies. While in America 5,000 chemical engineers were being produced in a year, despite the lack of them in Britain only 200 a year were being produced.

Wherever he had travelled, Sir Harold concluded, he had found an increasing demand for and realisation of the value of the chemical engineer and his services. In South Africa, for instance, there was a demand for chemical engineers in every industry from diamonds, gold and uranium to cellulose and food processing.

Chemistry and Food

Chemistry's significant part in overcoming the food shortage was emphasised by Sir William Slater, secretary of the Agricultural Research Council, in his address on 'Science and An Expanding Agriculture.' Famine was inevitable, he declared, if food production remained static.

Chemists, entymologists and plant physiologists were waging a continuous war against pests, diseases, rabbits and rats which did more than £1,000,000 worth of damage to crops every year.

Increased food production would require greater use of chemicals for fertilisers, control of pests, and so on.

In the session devoted to food processing a survey of the reactions involved in the conversion of flour into bread and of the function and action of chemicals used commercially as flour and bread 'improvers' was given by Dr. A. J. Amos, consulting chemist

of D. W. Kent-Jones and A. J. Amos, who began his paper on 'The Chemistry of Breadmaking' by emphasising the need for maintaining a high standard of quality.

If good bread was to be produced, he said, two requirements must be met. An adequate amount of gas must be produced within the dough, and sufficient of that gas for proper aeration must be retained. If the breadmaking technique was correctly performed, gas production was related to the ability of the dough to convert some of its starch into sugar during the fermentation.

This sugar-forming ability was governed by the proportion of distatic enzymes which was present in the flour and to the susceptibility of the starch to the attack of these enzymes. The enzyme content was determined by the wheats from which the flour was produced, while the resistance of the starch was influenced by the conditions which applied during the milling process.

The gas *retaining* power of the dough was related to the proportion of protein in the flour and to the physical properties of that protein. The protein content and the initial protein characteristics were determined by the wheats from which the flour was milled but the properties of the protein underwent changes after the flour was produced, these changes being either natural or induced.

Storage Not Now Necessary

As flour aged the physical properties of its protein altered in a direction which enhanced considerably the breadmaking quality of the flour; 'aged' flour not only furnished much better bread than freshly-milled flour but it was much easier to deal with in the bakery. The optimum effect of natural ageing, which was attained only after several weeks' storage, could be realised promptly by the addition to flour of a minute amount of one of several oxidising substances.

Some of these substances not only enabled the flour to make lighter and more easily masticated and digested bread which kept longer but also removed some of the natural yellowness of the flour. This bleaching effect was also a concomitant of natural ageing but then proceeded only slowly.

Accumulated scientific evidence suggested that the artificial ageing agents which were in use produced their beneficial effect upon the physical properties of the protein, and hence their enhancement of baking quality, mainly by increasing the cross-linkages between adjacent protein chains.

The question of the artificial ageing of flour had been brought to the fore by the distorted publicity which was accorded to nitrogen trichloride after it had been shown that flour treated with this artificial ageing agent could cause dogs to develop running fits. The very intensive research which had followed this unwarranted scare had failed to produce any evidence that the substances in use for the artificial ageing of flour, including nitrogen trichloride, were in any way harmful to man.

As bread aged it became stale owing to the starch of the crumb changing from the alpha form to the beta form, a change which proceeded even if the loaf was kept under conditions which prevented loss of moisture. The onset of staleness was characterised by the development of a harshness and a crumbliness in the crumb of the loaf.

Bread Preservers

Considerable attention had been paid in recent years to the incorporation in bread doughs of substances which increased and preserved crumb softness. These substances were surface active agents but not all of them could yet be accepted as completely innocuous if consumed regularly.

'Processing of Fats' was described by Mr. P. N. Williams, manager, Margarine & Edible Oils Division of Unilever, Ltd., who said that the processing of oils and fats for edible purposes in the United Kingdom consisted predominantly of three methods.

First refining of crude oils and fats from vegetable and marine sources; second, hydrogenation to render marine oils edible and to provide adequate supplies of solid fats of varying consistency from both vegetable and marine oils; and third, conversion of the major portion of the refined oils and fats, both non-hydrogenated and hydrogenated into margarine and cooking fats.

The principle crude oils processed were coconut, palm kernel, groundnut, sunflower, cottonseed and palm from vegetable sources, and whale from marine sources.

Vegetable oils had become the most important source of fat supplies during the last 50 years and were likely to increase to meet the demands of a rising population, because they provided the most easily obtained source of fat at a reasonable price.

As importers of crude oils and fats or the

seeds and fruits from which they were obtained, the U.K. had to take what other countries were prepared to sell. Consequently our oil refiners had to be able to treat any type and any quality of crude oil available. The principal impurity which they had to remove was free fatty acid formed by the oil splitting. This was done by stirring about 30 tons of the crude oil in a steel vessel with an alkali such as soda, which combined with the fatty acid to form soap. The soap was run off and the residual oil washed with water to remove any remaining soap.

Final Processing

The oil was then dried *in vacuo*, stirred with a little fullers' earth and filtered. Any dark colour due to impurities in the original oil was removed partly by the alkali and partly by the fullers' earth. Finally, all objectional taste was removed from the oil by placing it in a closed vessel *in vacuo* and passing steam through it.

Hydrogenation of oils or fats was carried out after they had been refined, but not deodorised, by passing hydrogen through them in the presence of a trace of specially prepared nickel. The nickel helped the hydrogen to combine with liquid oil and by varying the amount of hydrogen added solid fats of differing consistencies could be obtained. When marine oils were hydrogenated all their fishy odour was removed.

The most modern process for making margarine consisted of pumping a mixture of edible oils and fats and milk through a cooled stainless steel tube fitted with an agitator called a Votator. Without coming into contact with air the solidified emulsion was worked in another tube and passed straight to an automatic weighing and packing unit. Although this plant had been used successfully in the U.S.A. for making cooking fats, it did not give, when initially tried for margarine, such a good quality product as the intermittent churn-drum process hitherto used in Europe.

Research in England had shown, however, that by careful adjustment of the crystallising and working conditions a first-class product could be made and the process had the advantages of being (1) continuous, (2) keeping the product out of contact with air, (3) economising in space.

Selection of the mixture of oils and fats to give a margarine which would spread well at prevailing temperatures and neither be too firm nor too soft was carried out by measuring the solidity of the mixtures in an instrument called a dilatometer.

Nowadays the food value of margarine in the U.K. was unquestionably recognised as equal to that of butter. This was not so 30 years ago. Research, however, in the laboratories of the Unilever organisation in 1925-6 led to the first practical method of incorporating in margarine the necessary amounts of vitamins A and D in which it was then deficient.

Shortening or cooking fats, which were the other products in which edible oils and fats were used, were made by chilling and plasticising the liquefied fats in a Votator somewhat similar to that used for margarine and incorporating into the fat a small percentage of air or nitrogen. The type of shortening which had long-keeping properties and ideal texture for use in cooking operations was that made from slightly hydrogenated oils such as groundnut oil.

In his address to the Physics section (section A), which was illustrated by photomicrographs, Dr. H. D. Keith, lecturer in physics at Bristol University, spoke on 'The Surface Reduction of Silver Halide Crystals,' and described some recent experiments carried out by Dr. J. W. Mitchell and himself.

Process Not Clearly Understood

Considering the important rôle now played by photography and photographic recording in experimental science and in everyday life, it was, he said, perhaps rather surprising that neither the sensitisation nor the development of photographic emulsions was clearly understood. It was established some years ago, however, that, during development, the minute crystallites of silver bromide in a photographic emulsion were reduced to small masses of metallic silver, and these masses, if produced by fairly vigorous developers, were seen under the electron microscope to consist of tangled masses of filaments, closely resembling seaweed in appearance.

This observation influenced photographic theory significantly and was thought to provide convincing experimental evidence in favour of an extrusion theory of development. It was postulated that silver bromide was converted to silver only at certain localised points on the surface of an emulsion grain where they must be in direct contact;

as freshly-formed silver was added to that already present the latter was pushed away or extruded from the surface in the form of a fine filament.

Recent work by Dr. Mitchell and himself had shown, however, that this theory was untenable and that an altogether different mechanism was responsible for the formation of silver filaments. In these experiments, difficulties, which were normally encountered in a microscopic study of development and which devolved from the extremely small size of emulsion grains, were largely obviated by growing fairly large, though thin, single crystal sheets of chemically pure silver bromide (3 cm. in diameter and 100-300 microns thick) from the melt.

By subjecting these to suitable chemical treatments, it was possible to reproduce closely the conditions normally found at the surface of an emulsion grain; furthermore, by developing the sheets, both the macro- and micro-structures of normal development silver, including the filamentary form, could be obtained on an enlarged scale. Direct observations of development in progress were made under relatively ideal conditions and informative experiments had been carried out simply and rapidly by controlled adjustment of the variables.

One of the most important results of these experiments was that, even with developer which did not contain a specific solvent for silver bromide, silver ions were transported from the silver bromide to the developed silver largely through the developer solution. Consequently, the micro-crystalline structure of developed silver depended upon the conditions under which silver ions were discharged and deposited on the growing mass, and it had been shown that the formation of silver filaments was due to the presence of an adsorbed layer (probably of silver sulphide), the interfacial energy of which stabilised them.

Satisfactory Theory in Sight

It was believed that, as a result of the experiments, a satisfactory theory of photographic development could now be formulated. Photographic sensitisation was also being studied by a similar technique.

Problems of higher technological education were surveyed by Major-General C. Lloyd, director of technology, City and Guilds of London Institution, in a paper delivered to the Education Section (Section L).

While the Government policy for technical colleges laid down in the Ministry of Education Circular 255 had much to commend it, he would have preferred the number of colleges eligible to be upgraded to be limited to say, six, and restricted to advanced work.

If the technical colleges were to go ahead with their higher work there were two essential requirements. First they must attract the right quality among the teaching staff, and second, the courses must be conducted in the right atmosphere.

To obtain these essentials it was necessary to have facilities for research for the teachers and the colleges should be made virtually autonomous and independent of the local education authority. Only in this way could they develop the essential climate of freedom.

The contribution of the universities to higher technological education, Major-General Lloyd considered inadequate. They had nothing to lose and much to gain by accepting this responsibility at a time when the increasing application of technology to the national life had become inescapable.

Agents for German Sugars

Moorgate Produce & Chemicals, Ltd., have been appointed the U.K. agents for Messrs. Carbon GmbH, of Lübeck-Schlutup, who are producers of *d*(+)-Xylose purissimum. Additional sugar species and sugar combinations are planned for future production including *d*-Galactose, *l*-Arabinose, *d*-Mannose and Laevulose. Messrs. Carbon GmbH have stated that the production of other types of sugars likely to be of interest to users in the U.K. will be considered.

No More Cold Feet for GI's

The U.S. Army has recently reported new methods that will reduce shrinkage in wool blankets to a maximum of 10 per cent in 10 to 15 launderings. In the same number of washings, untreated wool blankets lose from 30 to 40 per cent of their size and much of their warmth, because their fibres become matted. In one of the new methods blankets are chlorinated by a process similar to dyeing. The other method impregnates the wool with melamine resin and cures resin into the fibres. The treatments cost from 30 to 40 cents (2s. 6d.) per blanket.

Coryton Oil Refinery

Vacuum Oil Company's Expansion

RAPID progress has been made in the last few months on the £12,000,000 refinery of the Vacuum Oil Company, Ltd., which is now nearing completion at Coryton, Essex. It is hoped that some of the units will be in operation by the end of this year and that full production will be attained by the midsummer of 1953.

The project is an excellent example of Anglo-American co-operation. No less than 95 per cent of the materials, plant and equipment are of British production and manufacture and the labour force is British. Technicians have been supplied from America, while the finance has been equally provided by the Socony-Vacuum Oil Co., Inc., U.S.A., and the Powell Duffryn Group.

Outstanding Feature

One of the outstanding technical features of the refinery will be the 272 ft. high thermofor catalytic cracking unit, which is the most recent development of the Socony-Vacuum Oil Company, Inc. This will be the first of its kind in the United Kingdom, and only the second in Europe.

A full survey of the expansion and activities of the Vacuum Oil Company, Ltd., is given by the chairman, Mr. J. C. Gridley, in his statement issued with director's report and accounts for the year ended 31 December, 1951.

The Birkenhead oil compounding and blending plant has been reconstructed and a new grease plant begun. Plans have also been put in hand for the modernisation of Wandsworth compounding and blending works.

At the begnning of 1952 Vacuum Oil entered the petrol and diesel oil market in the U.K. This extension of marketing activities has called for the construction of a number of distribution points and the assembly of a new fleet of road tankers.

Partly because of the inclusion of petrol and other fuels for the first time, the value of stocks jumped last year by some £900,000, thus reaching almost double the figure for the previous year.

The company's expansion is clearly reflected by the changes in its financial structure. During 1951, issued share capital was increased by £530,000. By the middle of July, 1952, it had risen further by some £1½ million to nearly £9,000,000.

Extra capital required as expansion proceeds will be provided by additional capital subscriptions made by Socony-Vacuum and Powell Duffryn in equal proportions, and by advances from the Finance Corporation for Industry.

The general rise in construction costs has increased the total commitment in respect of the Coryton Refinery and other capital works beyond the original estimates. However, it is not expected that any material changes will have to be made in the revised financing arrangements made in 1951. Capital commitments outstanding at the beginning of 1952 amount to £5,000,000.

Owing to the steep rise in costs, the net trading profit for 1951 (£306,332) was 31 per cent lower than in the preceding year (£444,319), despite the expansion of sales.

In its present stage of development, the company is inevitably facing acute problems in 1952, but confidence is expressed about the long term prospects.

Post-Advanced Lectures

POST-ADVANCED lectures for 1952-53 in chemistry being sponsored by the Manchester and District Advisory Council for Further Education are given in a recently published booklet. These courses are not part of the normal provision at the University and Technical Colleges in the area, but are one of a series given in each session in specialised branches of chemistry. There are six different courses: the design of experiments (II); the statistical analysis of experimental results; surface and colloid chemistry; the design and operation of fractional distillation plant; theoretical aspects of colour chemistry; and recent advances in inorganic chemistry. Further information and copies of the booklet may be obtained from the Honorary Secretary of the Council at Deansgate, Manchester, 3.

U.S. Consultants' Dinner

The annual meeting of the American Association of Consulting Chemists and Chemical Engineers will be held on 27 October in New York. On the following day the annual dinner meeting will be held. A symposium on 'Everyday Chemistry—Cosmetics and Household Chemicals' will take place at the same time.

A Review of Phenol Analysis

Part IIId—Determination in Miscellaneous Products (ii)

THE previous part of this review constituted the first half of section IIId. This article, the second half, concludes the series.

(c) PHARMACEUTICAL PRODUCTS: Thymol, in Compound Elixir of Thyme may be very simply determined by a diazometric procedure[116]. Dilute 10 g. of the elixir with 10 ml. of water and treat 2 ml. of the dilute solution with a mixture of 3 ml. of 0.6 per cent sulphanilic acid solution and 1 ml. of 0.75 per cent sodium nitrite solution. After one minute, add 2 ml. of 3 per cent sodium hydroxide solution and after another minute make up to 25 ml., and compare the colour with that of a thymol solution of known composition as standard.

Phenol in *Glycerinum Acidi Carbolici* has been determined by a nitrosometric procedure[117]. 5 ml. of sample are diluted with water to 100 ml., and 1 ml. of the solution treated with 1 ml. of 10 per cent sodium nitrite solution and 1 ml. of 2N sulphuric acid. After 10 minutes the solution is diluted to 50 ml. in a Nessler tube; the colour should match exactly that obtained when 1 ml. of a 1 per cent solution of phenol is similarly treated.

Phenol in lozenges can be determined by grinding one lozenge in a mortar with water, transferring to a graduate and adjusting the volume to 30 ml. The solution is filtered, a 10 ml. aliquot taken, and the test completed as above; 1 ml. of the standard is diluted with 9 ml. of water before adding the sodium nitrite solution.

Millon Colour Reaction

Deniges[118] has applied the Millon colour reaction to the rapid determination of small quantities of phenol in glycerol. 1 ml. of the glycerol is diluted to 10 ml. with water, and 1 ml. of this diluted solution placed in a test-tube containing 2 ml. of Millon's reagent and 0.2 ml. of acetic acid. The tube is then immersed in a bath of boiling water for 5 minutes, cooled, and the colour compared with a set of standards prepared by treating glycerol solutions of known phenol content in the same manner. Elvove[119] used the Millon reaction as the basis of a colorimetric method for the determination of the cresol or phenol preservative in antitoxic sera. His method is as follows:—0.5 ml. of sample is transferred to a 1 litre flask, diluted with water to 275 ml., and mixed with 25 ml. of diluted sulphuric acid (1 : 1). The contents are distilled until 200 ml. is collected. The distillate is then filtered into a glass-stoppered bottle and thoroughly mixed. 10 ml. of the solution are added to 5 ml. of freshly prepared Millon's reagent. Simultaneously, 10 ml. from each of four standard cresol solutions (0.1, 0.2, 0.3 and 0.4 per cent) are similarly mixed with 5 ml. of Millon reagent. The colour which develops in the sample after it has stood for 10 minutes is compared with the colours developed by the standard.

Bromoindophenol Reaction

The bromoindophenol reaction can also be used to determine phenols in sera[120]. To avoid loss of phenol on coagulation of sera in acid media, coagulation is affected in alcoholic media, and the reaction allowed to take place by adding 24° Bé. ammonia and water saturated with bromine. Very comparable blue colorations are obtained.

The following method[120] has given almost theoretical results for the assay of strong and mild resorcinol pastes:—To 1 g. of resorcinol paste in a 250 ml. flask, add 40 ml. of hot water, stopper tightly, shake vigorously, decant through a wetted filter into a 100 ml. volumetric flask, repeat twice with 15 ml. of hot water, rinse the contents of the flask on to the filter, and wash with hot water to a total filtrate of 100 ml. To 40 ml. of filtrate in a 500 ml. stoppered long-necked flask add 50 ml. of 0.1N bromate-bromide solution, 50 ml. of water and 5 ml. of hydrochloric acid, stopper immediately, shake, allow to stand for one minute and dilute with 20 ml. of water. Add 5 ml. of 10 per cent potassium iodide solution, allow to stand for five minutes and titrate with 0.1N thiosulphate solution in the usual way.

1 ml. of 0.1N bromine≡1.835 mg. of resorcinol.

Towne and his co-workers[121] determined free phenols in oil of wintergreen (methyl salicylate) by extracting a solution of the sample in benzene with 1 per cent sodium hydroxide solution, acidifying the solution

to *p*H 9, buffering with borax and distilling. Then the titrimetric bromination method was applied. The method is rapid and accurate, and permits the detection of as little as 0.001 per cent of free phenolic bodies, and is reproducible to 0.0003 per cent.

A rapid method for the determination of phenol and salicyclic acid in ointment has been devised by Eldson[123]. 0.5-0.6 g. of the ointment is weighed into a 150 ml. wide-mouth flask, and dissolved in chloroform by warming gently. 25 ml. of 0.1N sodium carbonate is added, the solution heated to boiling, with constant shaking, diluted with 25 ml. of cold water, and cooled. Finally, 15 ml. of 0.1N iodine solution are added, the solution allowed to stand for five minutes, dilute sulphuric acid added until slightly acid, and the excess of iodine titrated with 0.1N thiosulphate solution.

Phenolic Medicaments

Iodometric methods have also been used by Luce[123] for the analysis of some phenolic medicaments. For the determination of phenol in gauzes, the method recommended is: The phenol is dissolved out with water and 5-30 ml. of solution treated with 10 ml. of 33 per cent potassium bromide solution, 30 ml. of 95 per cent alcohol, 5 ml. of 0.1N bromate solution are added, and the iodine liberated is titrated with 0.1N thiosulphate solution.

Salicylic acid and salol, the latter after saponification, also react with bromine and can be determined like phenol, after neutralisation with sodium hydroxide.

1 ml. of 0.1N thiosulphate≡1.566 mg. of phenol
≡2.3 mg. of salicylic acid
≡1.783 mg. of salol.

Jenkins and Dunker[124] have examined methods for the assay of phenols in official medicaments and have recommended the following procedure:—Introduce a sample containing about 40 mg. of phenol into a glass-stoppered flask, dilute, add 30 ml. of 0.1N Koppeschaar's solution, add 5 ml. of concentrated hydrochloric acid, shake for 5-10 minutes, add 5 ml. of 20 per cent potassium iodide solution, shake for 3-5 minutes, add 1 ml. of chloroform and titrate with 0.1N thiosulphate solution. Glycerite of phenol and phenolated iodine solution can be assayed directly without separating the phenol. Camphorated phenol, phenolated oil and phenol ointments can be assayed satisfactorily after extraction of the phenol with water.

Surface tension methods have proved successful for the determination of phenol, thymol and menthol in some pharmaceutical preparations. Izmailov and Shvartsman[125] determined the relationship between surface tension and concentration for phenol in 3N sodium chloride solution, for thymol in a saturated solution of benzoic acid in 1N sodium chloride solution and for menthol in 2N sodium chloride solution. They developed a method for the determination of small amounts of phenol in glycerol (with an accuracy of not less than ± 3 per cent) thymol in sodium bicarbonate (± 5 per cent) and menthol in peppermint (± 3 per cent). The well-known Cantor-Rebinder surface tension technique was found to be most convenient.

(*d*) DISINFECTANTS: McCarley[126] has determined phenol and its homologues in disinfecting fluids using a physical volumetric technique. 50 g. of fluid is treated with 100 ml. of saturated barium hydroxide solution and 25 ml. of 0.1N barium chloride solution, and the containing flask is immersed in boiling water for 15 minutes with constant agitation. The mixture is filtered, and the precipitate scraped back into the original flask, treated as before and filtered. The combined filtrates are shaken with light petroleum, and the alkaline solution is treated with an excess of hydrochloric acid. The acid solution is extracted three times with ether, and the ether solution washed with sodium carbonate. Three extractions with alkali take up the phenols, and the alkaline solution is evaporated to about 15 ml. and treated with sulphuric acid in a burette. The volume, when cool, multiplied by 2.1 gives the percentage of phenols. The method is recommended for fluids with a phenol content up to 5 per cent.

Cresols in Lysol

Jarvinen[127] has critically examined the bromine and iodine methods for the determination of cresols in lysol, and obtained satisfactory results only under certain definite conditions. The procedure recommended is:—Dissolve the sample in alkali and precipitate oleate as barium oleate (solution A), acidify an aliquot of the filtrate, extract with equal parts of ether and benzene, then evaporate the resulting extract.

to dryness and weigh the residue. Dissolve the residue in dilute sodium hydroxide solution (solution B) and brominate with 0.2N bromate and 2N hydrochloric acid. At the same time brominate an aliquot of solution A and determine the excess bromine iodometrically. The bromine consumption of solution B divided by the quantity of cresol present gives the bromine number. The bromine consumption of A divided by the bromine number gives the quantity of cresols in lysol.

(*e*) PHOTOGRAPHIC DEVELOPERS: Baumbach[128] has given the distribution ratios for hydroquinone and metol between ether and water as a function of sodium sulphite concentration and *p*H. He presents a new analytical method for the determination of hydroquinone and metol in a photographic solution, where the developing agents are salted out of the solution at the proper *p*H by means of sodium sulphite and determined iodimetrically.

Strauss[129] determined the sum of metol and hydroquinone in alkaline solution by titration with potassium ferricyanide to a brown-red end-point. Reproduction of the end-point was facilitated by comparing the sample with an artificial standard prepared from a dye solution. Although both metol and hydroquinone are oxidised by ferricyanide, only the latter takes part in the colour-forming reaction. With 5-12.5 g. of sodium sulphite present per litre, the titration consumes 4 moles of ferricyanide for each mole of developing agent oxidised. At any higher sulphite concentration, there is a slight increase in titre which can be corrected for by standardising with a developing agent solution of the same sulphide ion concentration as the developer to be analysed.

Developer Analysis

Rees and Anderson[130] use a u.v. spectrophotometric technique for the simultaneous determination of Elon and hydroquinone in developers. A sample of the developer solution is diluted with a *p*H 5 acetate buffer and its absorbency measured at two wavelengths in the u.v. region. The concentration of methyl-*p*-aminophenol and hydroquinone in a fresh, unused developer solution can be determined directly from these two absorbencies. Used or old solutions are analysed by extracting unoxidised compound with ethyl acetate. Absorbency measurements made on the system before and after extraction serve to determine the amount of methyl-*p*-aminophenol and hydroquinone present.

(*f*) AIR: To determine the sum of phenol and cresols in air[131], 1-2 litres of the air are collected in a flask containing 15 ml. of 0.1N sodium hydroxide solution. After 24 hours, 10 ml. of the solution are transferred to a 100 ml. volumetric flask, neutralised with 0.1N acetic acid and 10 ml. of diazo solution (prepared by treating 100 ml. of a 0.005M *p*-nitroaniline solution with an equivalent amount of sodium nitrite solution and shaking vigorously for 10-15 minutes) added. 20 ml. of 0.5N sodium carbonate solution are then added dropwise, the solution diluted with 0.1N sodium hydroxide solution to 100 ml., and the colour compared with standards. Lovelock[132] determined phenols in very low aerial concentration by absorbing in a mixture of sulphanilic acid and sodium nitrite buffered with phosphates.

Bell Method Used

The bell method was used by Liesegang[133] as an aid in the determination of phenols in the air. An extraction thimble with the bottom cut away is stretched over a bell glass, soaked in 50 ml. of saturated sodium carbonate solution and exposed to the air in question for 24 hours. The thimble is then pulverised and thoroughly extracted with water, the liquid evaporated to 150 ml., cooled, and solid copper sulphate added to prevent distillation of interfering sulphur compounds. Phosphoric acid is added until the solution is acid to Congo red, the mixture is distilled and determined by the method of Folin and Denis. A correction factor of 0.03 mg. of phenol must be subtracted from the value obtained.

(*e*) WATER: Molte[134] has employed a diazometric method for the determination of phenol in river water. At the time of taking the sample, add 0.25-0.3 g. of sodium hydroxide per 100 ml. of water. To 100 ml. of the water, add 5 ml. of 25 per cent phosphoric acid and distil off 80 ml. Add 20 ml. of distilled water and distil off 20 ml. more. Mix, take half the distillate, add 30 ml. N sodium carbonate solution and mix with diazotised *p*-nitroaniline. A maximum red colour develops in 10 minutes which can be compared with standards.

Phenol and cresols can be determined together, but polyhydric phenols react much

more slowly and have no serious effect. The standard solution used should contain 1 mg. of cresol per litre. Czensy[135] uses *m*-nitroaniline in place of the *p*-isomer normally used. It has the advantage that the quantity of nitrite added during diazotisation may vary widely without affecting the colour developed.

Phenol in River Water

Folpmers[136] has critically discussed the different methods for the determination of minute traces of phenol in river water. Determination with 2,6-dibromoquinonechloroimide is influenced too much by the presence of oxidising or reducing impurities in the water and is complicated by buffering. The *p*-nitroaniline method is easier, but gives variable results. The author worked out a standard diazometric method to avoid the difficulties likely to occur, but had to use an empirical factor to give the true amount of phenols.

The determination of small quantities of phenol in ordinary water has been accomplished satisfactorily[137] with 2,6-dibromo-N-chloroquinoneimine, despite the above claims. To 100 ml. of water, add 1 ml. of manganous sulphate reagent (169 g. of manganous sulphate, 10 g. of copper sulphate and 500 ml. of 2N hydrochloric acid in 1 litre of distilled water), stir vigorously, add 2.5 ml. of N sodium hydroxide solution, mix, and add 10 ml. of 4 per cent borax solution as buffer and 2 ml. of dilute reagent (15 mg. of 2,6-dibromo-N-chloroquinoneimine dissolved in 10 ml. of ethanol and 0.5 ml. of 0.1N hydrochloric acid: dilute to 10 times its volume). Stir up the manganese oxide precipitate, stand for 4 hours, add 10 ml. of *iso*amyl alcohol, stir for 20-30 seconds, allow the layers to separate, remove the alcohol layer and place in a comparison tube, filling to the mark. Compare with tests made with known amounts of phenol. The method is direct and avoids distillation of the sample. Neither colour, turbidity, or salinity of sample interfere.

Polluted Natural Waters

Vorce[138] has determined minute amounts of phenols in polluted natural waters using the Folin-Denis phenol reagent:—2-3 litres of water are freed from calcium, magnesium, etc., by treatment with sodium hydroxide. Hydrogen peroxide is added to the filtrate and the solution allowed to stand overnight. The solution is then concentrated to 200 ml., acidified with citric acid and distilled. The phenol in the distillate is then determined.

Liebert and Deerns[139] examined this method and found that rubber or cork used in the apparatus often contaminated the sample. The peroxide treatment is best effected in the dark. The authors obtained high results, as other compounds reduced the reagent.

Bach[140] also used this method and obtained good results at a dilution of 1 in 10,000,000 and fair results for 1 part of phenol in 100,000,000 parts of water.

By means of the picrate colorimetric method (reaction between phenol, nitric and sulphuric acids) Babkin[141] determined as little as 1 mg. of phenol with an accuracy of ± 2 per cent. A rapid method for the colorimetric determination of phenol in in waters and brines has been advanced by Martin[142]. In slightly ammoniacal solution in the presence of potassium ferricyanide, phenol reacts with 4-aminoantipyrine to give a sensitive red colour, which may be used for the determination.

Travers and Avenet[143] preferred a titrimetric method for the determination of phenols in coking plant waters. The phenols in acid solution were distilled with superheated steam, and the sulphur compounds in an aliquot of the distillate oxidised with hydrogen peroxide. The excess peroxide was destroyed, the solution neutralised and a trace of cobalt salt added. Then sulphuric acid was added in excess and the solution titrated dropwise with bromide-bromate solution until the odour of bromine was detected. A small excess of potassium iodide was added and the iodine liberated was titrated in the usual way with thiosulphate solution.

Spectrographic Method

Barac[144] proposed a u.v. spectrographic method for the determination of free and sulpho-conjugated phenol in pure solution. Phenol in ether solution shows absorption maxima at 2670, 2740 and 2807 Å. The molecular extinction coefficient for the 2807 band is 2400. The amount of phenol added to water was determined by adding 20 drops of hydrochloric acid to a given volume of solution, extracting twice with ether, diluting to a given volume, drying on a filter and determining the absorption of the ether solution. The amount of sulpho-conjugated

phenol was determined as above by hydrolysing a given amount of solution with 2N hydrochloric acid. Free and total phenol were determined by spectrographic analysis of the ether extract before and after hydrolysis. Results agreed well with other methods.

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Part-Time Courses

Programme at Acton Technical College

THE continued shortage of chemical engineers has given rise to a demand for an increase in the facilities for chemical engineering education, outside the universities. As a help towards meeting this demand an approved scheme for part-time courses in chemical engineering at technical colleges has been approved by the council of the Institution of Chemical Engineers. The proposed part-time courses will extend over three years, at the end of which candidates will sit for the Higher National Certificate in Chemical Engineering.

Entrants must be holders of Ordinary National Certificates in Chemistry or in Mechanical Engineering. There are certain stipulations in the scheme concerning the subjects studied for these certificates.

At Acton Technical College the first three-year course will begin in September for a limited number of candidates. Later when the new building, now under construction, is completed, additional laboratories for chemical technology will become available and the fourth year Endorsement course will be established.

Courses will be held mainly in the evening, but certain subjects may be taken in part-time day courses. First enrolments will be at the college on 17 and 18 September at 9.30 a.m. or 7 p.m. Fees (per session, per course) are 30s. first year and 35s. second and third years.

Other interesting post-graduate and higher technological courses announced for the 1952-53 session by the chemistry and biology department of Acton Technical College include:

Plastics Technology

Chemistry and Technology of Plastic Materials, a two-year course intended to cover the requirements of Section A of the Associateship examination of the Plastics Institute. Beginning on 24 September lectures on the Technology of Plastic Materials will be held on Wednesdays from 6.30 to 9.30 p.m. and lectures on the Chemistry of Plastic Materials on Thursdays at the same times.

An alternative course, also of two years, on Plastics Machines and Mould Design, to cover the construction, principle and operation of machinery in the plastics industry will begin on 23 September. This will also include the technology of plastic materials. Plastic machines and mould design classes will be on Tuesdays and the technology of plastic materials classes on Wednesdays, the periods being from 6.30 to 9.30 p.m. on both days.

Some aspects of the 'Modern Chemistry of Oils, Fats and Waxes' will be the subject of 12 lectures to be given on Friday evenings at 7.30 p.m., beginning on 26 September. The first two lectures will be given by Dr. J. H. Skellon, head of the chemistry department and the remainder by research chemists and consultants who are specialists in their particular field.

Recent progress in the knowledge of vitamins will be discussed by Dr. A. E. Bender, senior chemist, the Crookes Laboratories, Ltd., in a series of 12 lectures on Wednesday evenings at 7.30 p.m., beginning on 1 October.

Israeli Potash Plans

Chloromycetin Also to be Produced

AFTER the loss of the famous potash plant at the north end of the Dead Sea, the Palestine Potash Company has begun to establish a new plant at Sodom, on the south shore of the Dead Sea, and a motor road is nearing completion to convey the products over 100 miles down the Wadi el Arabah desert to Beersheba, and to the new lighterage port of Eilat, on the Gulf of Aquaba at the Red Sea. The town of Kurnub, renamed Mamshit, to the south-west of the new potash works, is to be developed as a rest and holiday centre for the potash workers, with a population of 15,000.

Under the final agreement signed this summer between the Israeli Government and the Palestine Potash Company, Ltd., the state sets up a new Dead Sea Works, Ltd., in which the Government holds 51 per cent of the shares. The new road from Sodom to Beersheba is due to be completed by January, 1953. When this is completed, Beersheba will be linked by rail to Haifa and the potash will be taken by road to Beersheba, and by rail, for export, on the ocean-going freighters at Haifa. Meanwhile, it will be conveyed by road from Sodom to Haifa, just as before the civil war it was conveyed by road from the north end of the Dead Sea to the Jerusalem railhead.

The Modern Problem

The present problem is to induce the technicians of the pre-war plant at Rabat Ashley, on the Jericho plain (most of whom have gone into other industries) to return and train the younger generation of engineers and chemical workers. For this reason the former managing director, M. A. Novomeysky, is serving as honorary president of the new Dead Sea Works. The Israeli government have five representatives on the board of the new company, including Alexander Goldberg, director of Fertilisers & Chemicals, Ltd., and Lord Glenconner and Israel Broide of the old board. The Finance Ministry is also represented. Every £1 shareholder in the old Palestine Potash receives two Israeli pound shares in the new company. A $2,500,000 loan from the U.S. Export-Import Bank is to be used to develop the new plant, along with Government long-term loans, until the plant is producing 135,000 tons annually. Palestine Potash, Ltd., is raising $1,000,000, chiefly from the Palestine Economic Corporation.

Abic chemical laboratories, in Ramath Gan, are shortly to produce the antibiotic drug chloromycetin, with a quarter of a million dollars worth of equipment invested in the company by Italian Jews. The American Parke Davis Company recently disputed in court the right of the Abic Company to infringe their patent in the drug, but the Abic Company, having previously marketed the drug, obtained from the Italian Lepetit Company, is now to produce it independently.

Photographic Exhibition

THE American Ambassador, Mr. W. S. Gifford, opened The Royal Photographic Society's 97th annual exhibition on Thursday, 11 September, in the Society's House, 16 Princes Gate, S.W.7, close to the Albert Hall. It will remain open to the public without charge from Friday, 12 September, until Sunday, 12 October, from 10 a.m. to 8 p.m. each day (Saturdays, 10 a.m. to 5.30 p.m.; Sundays, 2.30 to 5.30 p.m.). The exhibition will close at 6 p.m. on Tuesdays, so that the miniature colour transparencies can be projected, with commentary, at 7 p.m.

The Society's annual exhibition is recognised as the premier photographic exhibition, comprising as it does all types of photograph. Over 5,000 entries were received, of which 849 have been accepted. There are ten sections of the exhibition and the voluntary services of 38 selectors are required.

The purpose of the exhibition is to show work which provides a fair cross-section of contemporary photography, as shown by the material which is submitted for consideration.

After the London display the whole of the exhibition will be transferred to Leeds, where it will be opened by H.R.H. The Princess Royal in the City Art Gallery on Saturday, 25 October, and will remain open to the public until Sunday, 23 November. Thence it will go to Bristol where Lord Methuen will open it in the Art Gallery on Saturday, 6 December, prior to a further showing there until Wednesday, 31 December.

The History of BASF

A Resurrected German Firm

THE decartelisation of I. G. Farbenindustrie has resulted in the emergence of some of the original components of the combine as separate companies. An article in a recent issue of the *Export-Anzeiger* of Hamburg describes the part which Badische Anilin- und Sodafabric, of Ludwigshaven, one of the largest units, has played in the development of the chemical industry in Germany.

The firm originated in 1865. Nine years before that Perkin discovered mauveine by oxidising impure aniline and made the world's first synthetic dyestuff. In Mannheim Friedrich Engelhorn heard about Perkin's discovery, and being plagued with the problem of what to do about a tar byproduct in his factory for manufacturing lighting gas, decided to put the tar to use; he built a factory for the production of dyes and also began to make the auxiliary materials for the production of dyes. This was the origin of BASF.

Very soon the firm moved to Ludwigshaven and undertook the production of four dyes. In those days all resources were devoted to production—there was no research laboratory and no scientifically trained staff. This state of affairs was soon changed, however, and the first patent taken out did not concern a dyestuff but the extraction of benzene from lighting gas.

Alizarin First Success

After this, development went ahead very fast. The first success was the production of alizarin, due to Heinrich Caro, the first chemist employed by the firm. Research on the tar dyes increased as time went on, and by the mid-seventies Germany was supplying one half of the whole world's production. BASF itself at this time had an annual turnover of 4,500,000 marks a year, and this with four people in the sales department.

Sales were initially carried out through two important dealers firms; however, to improve personal relations with customers BASF concluded in 1873 a contract with Messrs. Siegle of Stuttgart. This firm was also a producer of synthetic dyes. The production of tar dyes remained in Ludwigshaven, while the rest, including the sales department, was concentrated in Stuttgart. For the sake of closer co-operation, however, between the commercial staff and the chemists, the sales department was moved back to Ludwigshaven in 1889. From then on customers were advised not only by the sales staff, but also by technicians, a fact that was highly appreciated.

'Technical Dye House'

Out of these beginnings the 'technical dye house' came into existence in 1891. Other laboratories soon followed, their object being research work in various special fields. In 1928 all laboratories were combined in the 'Coloristic Division'. The field of action of this division has been extended and it is now in charge of control of production. In addition, it works in the field of pure research, whereas the 'technical dye house' has developed into an important department of BASF within the last 60 years.

With the production of tar dyes that of inorganic ancillary products grew. Thus, BASF was already Germany's greatest producer of sulphuric acid in 1880. The method, however, was rather expensive until the Knietsch-Contact-Method was invented. However, it was the basis for the production of synthetic indigo. The chemical problem was solved after ten years of experiments, but it lasted until 1897 before production could be started. When production got going BASF had spent 18,000,000 marks, all for a single dye-stuff.

The synthesis of indigo had a truly revolutionary effect. By the turn of the century Germany imported about 13,000,000 marks worth of vegetable indigo; when the first world war broke out export of indigo headed the German list of exports with a volume of about 54,000,000 marks. As the greater part of this export originates from German raw materials it is particularly advantageous, because only 10 per cent of export proceeds have to be spent on the import of raw materials.

After the chemists had succeeded in producing synthetic alizarin and indigo, the next aim was to combine the valuable properties of these two products. 'Durability of the

dye must be equal to the durability of the fabric.' Already in 1901 it was possible to prepare indanthrene. Alizarin, indigo and indanthrene are the milestones in the chemistry of dye-stuffs.

But research work had not ceased. The aim was now to utilise the nitrogen contained in the air. Scientifically the problem was more or less solved, but a suitable method had yet to be evolved in order to be able to convert laboratory experiments into industrial production. In 1908 nitrogen and hydrogen were made into ammonia under pressure and in the presence of a catalyst which had at last been found. But many difficulties had yet to be overcome before production could be started on an industrial scale. New installations were required which were completed in 1912.

Nitrogen subsequently engendered many new activities such as production of fertilisers, synthetic urea and pesticides. From 1912 to 1951 BASF have converted into ammonia about 4,000,000 tons of nitrogen from the air. In developing the first high pressure method a number of further large-scale syntheses were developed, i.e., that of methanol from carbon dioxide and hydrogen, and of petrol from lignite tar. As a matter of course funds were required for these purposes that could only be provided by a firm of the size of BASF.

In the earlier stages of the company development was influenced by individual research with a certain end in view. Later on individual research gave way to systematic efforts by many in a team. Progress is now a joint affair involving all divisions, which get more and more closely interlaced.

A new field that has been given particular attention during the last twenty years is that of production of plastics on the basis of acetylene and ethylene. Here the first steps have been made into a promising field of chemical research.

BASF suffered severe war damage which amounts to 400,000,000 marks. To this, the loss of all patents has to be added, and to make things worse, there was a devastating explosion in the summer of 1948 which battered down nearly all that had been rebuilt after the war. Yet, since 1945, more than 1,500 patents have been applied for, and the works are now better than ever.

In the field of social welfare the firm have also done excellent work. The foundation stone for the first housing scheme for workers was laid in 1865, and now a quarter of the 26,000 staff live in flats owned by the firm. BASF has its own pension fund, and in the eighties it built the first works-owned tuberculosis sanatorium.

The river Rhine is the main artery of the works. Not only are 600,000 cubic metres of water per day required, but the Rhine is also the chief means of transport to and from the factory. Raw materials reach it by this route, and the finished products leave that way. Every year about 200,000 tons of raw materials are taken from the air in the form of nitrogen.

Economically speaking, the firm now occupy much the same position as they have done in the past—they are one of the leading companies in German industry. Compared with 1936 they have already reached a production volume of 150 per cent, with a turnover of 680,000,000 DM. yearly. After the decartelisation of I.G. Farben the sales organisation has had to be rebuilt from scratch, but this slow process is now gaining momentum.

Publicity Campaign

A big national advertising campaign to publicise the use of polythene in the field of sanitary engineering and plumbing is to be undertaken by Fordham Pressings, Ltd. and their subsidiary manufacturing company, G. & E. Equipment & Contracts, Ltd. The two firms hope to see polythene cistern floats gradually supersede the usual copper ball. G. & E. Equipment & Contracts, Ltd., are the makers of an acid bucket which is finding wide use in industry.

Ash & Clinker Conference

The Institute of Fuel is to hold a special two-day conference at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, on 28-29 October to study the problem of ash and clinker in industry. Among the subjects discussed will be the treatment and disposal of ash and clinker, the problems of deposits and corrosion and the influence of ash upon boiler design. The quantitative effect of ash on boiler efficiency will also be considered.

Materials Handling

Mechanical Equipment & Industry

ONE of the points which was emphasised in nearly all the reports of the various teams of Britain which visited the U.S.A. under the auspices of the Anglo-American Council on Productivity was the need for greater use of mechanical handling.

The use of machines to eliminate unnecessary handling is being increasingly recognised in the chemical industry, whether it be for very small amounts of pharmaceutical products, or for dealing with heavy chemicals in bulk, for high-speed capping of vials or the filling of drums and containers.

How to select the type of equipment best suited to any particular handling problem is therefore a matter of considerable importance to users in the chemical and allied trades.

'Materials Handling in Industry' (pp. 142, illustrations 109, price 8s. 6d.), published by the British Electrical Development Association, presents in easy reference form the wide range of mechanical handling devices in general use, together with details of their construction, characteristics and duties.

While a large proportion of mechanical handling equipment is electrically operated, the book deals with all types and is not confined to electrically driven or controlled appliances.

The book is divided into five main sections, according to types of equipment, covering runways and lifting equipment; cranes; conveyors; floor transport and storage; miscellaneous equipment. The text is divided into chapters, with paragraphs numbered continuously throughout the volume on the decimal system.

There is a general index and an index to materials, processes and situations. The latter is the easier in which to find equipment of interest to the chemical industry, but, presumably owing to exigencies of space, is not as detailed as could be desired.

The book, however, fulfils a useful purpose, covering as it does mechanical equipment of all kinds for widely diverse purposes from fertilisers to semi-liquid or lumpy materials, sticky substances, paint spraying, pneumatic plant for dealing with toxic or explosive vapours, storage, welding work and many others.

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Indian Workers' Achievement

ACCORDING to an official journal, *Indian Trade and Industry*, Dr. N. R. Srinivasan, of Bangalore, has discovered a new way to extract copper profitably from previously uneconomic ore. Dr. Srinivasan, who is well-known to readers of THE CHEMICAL AGE as he has been our Indian correspondent for several years, is now studying at Melbourne University under the Colombo Plan. Professor H. H. Dunkin, Associate Professor of Mining at Melbourne, in making the announcement said that Dr. Srinivasan had made a valuable contribution to Australian mineral research.

Dr. Srinivasan, who was a lecturer in Minerological Chemistry at Bangalore before he went to Melbourne, has carried the research to the stage where a good recovery of copper is possible. He is now continuing his research to find a chemical explanation for the results.

The *Age* of Melbourne in referring to Dr. Srinivasan in its issue of 5 July said: 'Thirty-year-old Indian scientist, Dr. N. R. Srinivasan, here under the Colombo Plan, is a modest man, who would rather talk about his hobby, his new daughter or his athletic ability than of his contribution to Australian mineral research.'

Two New Watford Products

THE Watford Chemical Company, Ltd., announce that they have recently developed two new products which are now in pilot production stage. These are available in small amounts to all interested clients, and quantities of the first mentioned can be made available up to 1 ton lots if necessary. The two products are: 2-hydroxy-4-methyl quinoline, melting point 220° C., and 2-hydroxy-4,6,8-trimethyl quinoline, melting point 252° C. These are available in off-white powder form and have the following suggested uses. As fungicides, especially as the copper salt; as intermediates for esters in perfumery, as fixatives; as dyestuff intermediates; as possible pharmaceutical intermediates; and, etherified or esterified, as possibly being of interest for quaternary ammonium compounds, owing to their complete lack of odour.

I.L.O. Chemical Session

Third Session Opened at Geneva

THE Chemical Industries Committee, one of the Industrial Committees set up by the Governing Body of the International Labour Office to deal with conditions in certain major industries, opened its Third Session in Geneva on 9 September, 1952. The Second Session of the Committee was held in Geneva in April, 1950, when resolutions covering a number of matters were adopted.

The agenda for the third session was:—

(1) General Report dealing particularly with:—

(a) Action taken in the various countries in the light of the conclusions of the previous session;

(b) Steps taken by the Office to follow up the studies and inquiries proposed by the Committee;

(c) Recent events and developments in the chemical industries.

(2) Vocational training in the chemical industries.

(3) General problems of hours of work in the chemical industries with particular reference to a comparison of day work and shift work.

The Committee is tripartite in character and the delegation from each country taking part may include two Government representatives and two representatives of each of the employers' and workers' groups. The representatives may be accompanied by advisers. The United Kingdom was represented at the meeting by the following delegation:—

Government representatives:

Mr. A. M. Morgan, Assistant Secretary, Ministry of Labour and National Service.

Mr. W. A. Treganowan, Principal, Ministry of Labour and National Service.

Employers' representatives:

Mr. G. Brearley, managing director, Brotherton & Co., Ltd., chairman of the Chemical Group of the Association of Chemical and Allied Employers.

Mr. E. T. Grint, Chief Labour Officer, Imperial Chemical Industries, Ltd.

Workers' representatives:

Mr. E. Higgins, National Officer, Chemical and Allied Trades, Transport and General Workers' Union.

Mr. J. Matthews, M.B.E., National Industrial Officer, National Union of General and Municipal Workers.

The employers' representatives were accompanied by advisers.

New British Standard

A NEW British Standard—B.S. 1154: 1952 'Vulcanised rubber compounds'—has just been issued to replace the war emergency specification published in 1944, which was based on the earlier Government Department specification T.G. 25A.

The new standard covers four white compounds and six black compounds, the former being produced from natural rubber and zinc oxide, and the latter from natural rubber, zinc oxide and lamp black. The various compounds are classified according to their hardness. The standard includes skeleton compositions as well as testing requirements, while an appendix includes mixes which give vulcanisates complying with the requirements of the standard.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1, price 2s. 6d.

C.I.L. 'Cocoon' Coating

A TYPE of vinyl coating designed for packaging military weapons, valuable machinery and precision instruments against corrosion has been developed by Canadian Industries, Ltd. It is now in production at C.I.L.'s West Toronto paint division. A somewhat similar product was developed in the United States a couple of years ago and sold to the Canadian Government for packaging aircraft engines, etc. Now, C.I.L. is moving into the market and has already landed a government order; it reports that its product is cheaper than the U.S. product.

Developed by the company's paint and varnish division, the coating consists of two different synthetic resin compositions applied with compressed air spray guns. The first, a clear webbing compound, forms a web around the object to serve as a base for the tough and much thicker protector coat. Within the 'cocoon' moisture is absorbed by crystals of silica gel and the equipment can be preserved against corrosion 'virtually indefinitely'. The coating is similar to one marketed in this country by British Geon, Ltd., but has fewer coats.

Dutch Soda Factory

American Expert Meets Director

FOLLOWING the discovery of salt deposits in the vicinity of Winschoten, Holland, discussions have recently taken place between Dr. W. Winsemius, Director-General of Industrialisation in the Netherlands and Dr. Z. G. Deutsch, an American authority on soda production, on the possibility of establishing a soda industry at Delfzijl, a port on the North Sea. Visualised is a soda manufacturing plant with a daily output of several hundred tons employing 400-500 people.

Extending over a width of several kilometres and with a thickness of about 1,000 metres the salt deposits are estimated to contain reserves of some 20,000,000,000 tons or sufficient to last a century. Normally the winning of salt is not pursued in the Netherlands by the underground cutting of rock salt, but by pumping water into the seams and forcing the resultant brine to the surface. The reason for this lies in the great depth of the seams, some 300 to 400 metres below ground level, at which depth underground working would not show any return.

The method used is also costly, but it has the advantage that the necessary evaporation of the brine produces refined salt in one operation.

Location Changed

The location of the salt industry in the Netherlands, following the normal tendency of mine workings, has, in the course of time, been changed. Its original site was at Boekelo, Overijsel, but at present the most important workings are in the region of the Twente-Rhine Canal, where it is within reach of coasters.

Presumably the newly-discovered Winschoten salt depots will be worked in a like manner. Under present consideration is the possibility of pumping the salt by pipeline to a factory to be erected near the port of Delfzijl.

Already the Dutch manufacture a number of chemical by-products from their salt deposits including caustic soda, carbonate of soda, sodium sulphate, sodium nitrate, chlorine and its derivatives, etc. Production of the elements Na and Cl is effected by electrolysis, the industry being in the hands of the N.V. Koninklijke Nederlandsche Zoutindustrie (Royal Netherlands Salt Industry).

Electric Shock Treatment

THE most effective design of electric-shock wall-card, of the type required by the Factories Act to be displayed in all works where electricity is used, is one which gives complete first-aid information in the fewest possible words.

With this in mind, Ernest Benn, Ltd., have for a number of years produced a shock-card hitherto unsurpassed in simplicity, but have now revised it in a way which makes the instructions even simpler to follow.

Such easiness of understanding is arrived at by describing the first-aid instructions in a minimum number of words and supporting them by the reproduction of four photographs of actual first-aid operations.

The latest available annual figure for electrical accidents is 778 but as under the Factories Act an accident is not reportable unless the person is disabled for more than three days from earning full wages at the work at which he is normally employed, there must be many accidents about which the Factory Department of the Ministry of Labour does not hear. Such cases are in most instances prevented from developing into more serious casualties by following the simple instructions on the electric-shock wall-card.

Since all premises falling within the scope of the 1947 Factories Act are required by law to give prominent display to electric-shock cards, it is in the obvious interest of the occupiers of those premises to display the wall-chart which gives instruction in the treatment of electric shock in the clearest, simplest and most easily understood form.

Such a card is that obtainable from Ernest Benn, Ltd., Bouverie House, Fleet Street, London, E.C.4 (price 3s. 6d.) Printed on stout paper board, measuring 13½ in. by 22 in., in red and black, it gives a complete explanation of what to do and how to do it in words and pictures which everyone can understand, in a size which makes their meaning clear to all at a reasonable distance. The card is varnished to preserve it against dust, and the hanging cord is unusually robust.

Performic Acid Explosion

Unexplained Accident at Quebec

FIVE ml. of performic acid exploded recently while being prepared at Laval University, Quebec, severely injuring the graduate operator and smashing all glassware within a radius of 2-3 ft., according to a report in *Chemical and Engineering News*. The acid was being prepared by addition of 25 gm. of 99 per cent hydrogen peroxide to 20 gm. of 99 per cent formic acid in the presence of 6.5 gm. of concentrated sulphuric acid as catalyst. After two hours for reaching equilibrium, the mixture was distilled under reduced pressure (5-10 mm. Hg) at 30-35°C. The material was known to be dangerous and all glassware was thoroughly cleaned with fuming sulphuric acid, the distillation apparatus being set up with ground glass joints without lubricant of any kind. The still was connected to a dry ice trap, manometer and vacuum pump through a length of Tygon tubing. Only 5-19 ml. of the acid were prepared at a time.

As nothing unusual happened while the material was heated for distillation, and as the distillate was kept at $-10°$ to $-15°$C., the operator felt that the danger was over, and, removing his face shield and the safety screens, reached for the receiving flask. As he was about to touch the discharge tube to collect a pendant drop, the flask exploded.

A number of compounds are known to decompose 90 per cent performic acid, but none of these were thought to be present. The residue in the distillation flask consisted of about 30 ml. of a dilute mixture of formic and performic acid, with some hydrogen peroxide also present. It was impossible to find out whether this mixture had also detonated as the whole glass apparatus was shattered. The only possible explanation put forward has been that the per acid was more concentrated than 90 per cent, and that as the remaining water was removed, it became sensitive to shock or dust particles.

British Lubrication Film

SINCE its first showing three months ago 'Basic Principles of Lubrication', an instructional film made for the Esso Petroleum Company, Ltd., by Technical Films, Ltd., has met with remarkable success. In the Scientific Section of the Venice Film Festival it gained the second prize, being in fact the only film of its type to get an award. Of the 27 films entered in this section, first, third and fourth positions were filled by medical films. It has been booked for showing at the 6th Congress of the International Scientific Film Association to be held in Paris from 23 September to 1 October.

Dr. F. P. Bowden, Sc.D., F.R.S. (Laboratory for the Physics and Chemistry of Surfaces at Cambridge University) acted as scientific adviser to the makers of this film, which is designed to present, in a form comprehensible to the non-technical as well as the technical audience, an explanation of the basic phenomena of lubrication. It is being used by the Government Departments and industrial firms in this country, and requests for copies have already been received from the U.S.A. and India.

Applications for the loan of 16 mm. copies of the film should be sent to The Manager, Industrial Sales Department, Esso Petroleum Co., Ltd., 36 Queen Anne's Gate, London, S.W.1.

Recruiting Drive Opened

FACED with a long-range shortage of trained man-power, American chemical companies were recently asked by the Manufacturing Chemists' Association to launch a drive to get more students into the field. As an initial tool in the programme, MCA is sending the companies copies of a manual outlining various student guidance activities.

The chemical industry may more than triple its sales volume by 1975, according to forecasts noted by MCA Board chairman William H. Ward. There is already a shortage in the number of chemists and chemical engineers available and the increase in students in these fields is far slower than the rate of expansion by the industry.

Object of the drive is to inform high school students, teachers, and parents of the career opportunities opening up for qualified young scientists in industrial chemistry and chemical engineering. The manual details a series of suggestions for doing this by plant tours, classroom talks, summer employment, regular personal interviews, scholarship programmes and other means.

The Chemist's Bookshelf

RUBBER TECHNOLOGY. Edited by R. C. W. Moakes and W. C. Wake. London, Butterworth's Scientific Publications. 1951. Pp. xiv + 200. Price 25s.

This book consists of the lectures given at the Croydon Summer School of the Research Association of British Rubber Manufacturers, edited by the heads of the Technology and Chemistry Divisions of the Association. The original aims of the Summer School were primarily to 'get across' to the industry some of the more recent ideas in rubber technology, and these have now been permanently embodied in book form.

Generally speaking, the lectures deal with subjects that have not been extensively covered in recent years and they provide a useful survey of these. The book is not, and does not pretend to be, a comprehensive textbook on rubber technology, but gives the results of recent research in various selected fields. The papers are, of course, by different authors, but they give a very good idea of the scope of the work of the Research Association since the war, centring mostly round compounding practices and materials, and the instrumentation and latest methods of testing of rubber.

In a lecture entitled 'Developments in Testing Instruments and Test Methods', A. L. Soden gives a valuable up-to-date review of physical methods of testing. Some of the apparatus mentioned at the School was only in the prototype stage and is thus really new, while other equipment described is only two or three years old and has not been fully evaluated up to now. There are also examples of apparatus which was described some time before the war, but has only recently reached full significance. Mr. Soden describes, for instance, the Hoekstra short-time plastimeter and the Roelig dynamic machine. The Lupke pendulum is also coming into its own because of increased interest in resilience with the emergence of synthetic rubbers.

Another good lecture on the 'Significance of New Ageing Tests' by J. Mann, reviews existing knowledge on the chemical reactions which take place during ageing, with a view to understanding the significance of the various accelerated ageing tests.

Recent developments in compounding are covered by R. C. W. Moakes. These developments are mostly variations and improvements in materials which have been in use for some years, and those chosen for review by Mr. Moakes are the effects of the use of reinforcing furnace carbon blacks and mixtures of them with mineral fillers, the development of white reinforcing agents from kaolin minerals, the use of resins as hardeners or reinforcing agents, and the uses of the newer synthetic rubbers Hycar PA, Neoprene W, and the Polysar acrylonitrile rubbers. The rubbers dealt with are only those which have reached or are likely to reach the British market.

Latex technology, which is the subject of a lecture by W. J. S. Naunton, formerly head of I.C.I. Rubber Services Laboratory at Manchester is a subject which the Research Association has only recently entered upon. The article is an interesting one and well written. Mr. Naunton was chairman of the Research Committee of the Association from the end of the war until last year.

There are three other lectures included in this book. 'Technology in 1951 and After' by J. R. Scott deals objectively with the state of rubber technology today, after 50 years' scientific study of it, and assesses progress attained towards a rational technique. W. E. Morton, Professor of Textile Technology at the University of Manchester, contributes a lecture entitled 'Resources of the Woven Fabric Designer'. It is difficult, however, to see why this was included, since it has virtually nothing to do with rubber technology. Finally, a lecture by W. C. Wake on Statistical Techniques in Rubber Technology' is included. This deals with less well-known applications of the techniques to rubber technology.—E.P.C.S.

D

HOME

Scottish Representative

Watford Chemical Co., Ltd. have announced that Mr. S. Beach, of 14 Drygatehead New Milns, Ayrshire, is now representing them in Scotland. Mr. Beach will also be available to visit all the friends of the company in the Northumberland/Durham area.

OCCA Meeting

The next meeting of the London Section of the Oil & Colour Chemists' Association will be held on Wednesday, 17 September at Manson House, 26 Portland Place, London, W.1, at 7 p.m., when Mr. P. J. Curtis will speak on 'Cadmium Pigments'. The meeting, as usual, will be followed by a discussion, and all interested persons are invited to be present.

Prices of Unrefined Oils

The Minister of Food announces that from 7 September, 1952, the price of crude linseed oil will be reduced from £185 to £180 per ton naked ex works. No changes will be made in the prices of other unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four-weekly period ending 4 October, 1952.

Aluminium Price Reductions

The British Aluminium Co., Ltd., have announced price reductions, amounting to 2d. a pound or nearly 8 per cent for bulk quantities, for the special range of thin gauge sheet and coiled strip for boxmaking and capping purposes. These reductions came into effect on 1 September and follow the completion of substantial extensions to their Falkirk Rolling Mills including the installation of new high speed tandem and finishing strip mills specially designed for the economic production of this class of material. The new rolling equipment also makes possible the inclusion of a stronger alloy for boxmaking at prices previously charged for pure aluminium and 1¼ per cent manganese alloy.

The new prices make aluminium for boxmaking and capping more competitive with tinplate than at any period since the war.

Lactic Acid Reduction

Bowman Chemicals, Ltd. have announced that the price of their dark technical lactic acid (44 per cent by weight) was reduced by £20 per ton from 1 September, making their new price £65 per ton, ex works, basis 5-ton lots.

Oil Imports to be Freed

The Minister of Food has announced that it has been decided to end the buying on Government account of linseed and linseed oil from overseas. The Ministry of Food has been the sole importer of these commodities since 1939. The arrangements under which private imports will be resumed under licence will be explained to the trade as soon as possible and prospective importers should await a further announcement by the Board of Trade before entering into commitments to purchase.

New Shell Solvents

Two new *iso*propyl solvents are now being offered by Shell Chemicals, Ltd. Known as Shell I.P.S. 1 and Shell I.P.S. 2, they are being marketed at a purity specification of 99 per cent I.P.A. by weight and 85 per cent I.P.A. by weight respectively. Prices at £90 and £76 per ton for the ten-ton rate are fully competitive. Supplied in tanker wagons or drums, the products can be used in a variety of outlets including surface coating, lacquer, plastics, leathercloth, printing, as well as for many other solvent purposes.

Dyestuffs Committee

Last week the Board of Trade announced that Sir William Palmer has been appointed chairman of the Dyestuffs Advisory Committee. Mr. E. J. Holford Strevens had been appointed deputy chairman and Mr. B. A. Ellis will represent the Department of The Government Chemist on the reconstituted Committee. Messrs. H. Jackson, H. Blackburn and H. Boothroyd will be the representatives of the Association of British Chemical Manufacturers (Group-D) and Mr. H. Gosling, the representative of the British Colour Makers' Association. The Colour Users' Association members will be Messrs. N. G. McCullock, D. Carter, A. R. Edge, and J. G. Evans. The secretary is Mr. C. G. Hulse of the Dyestuffs Office.

OVERSEAS

New Aluminium Plant in Alaska

The Aluminum Company of America, one of the three largest producers of aluminium in the United States, has announced plans for the construction of a new plant in Alaska that will eventually produce 400,000 tons of the metal a year, it is reported.

German Chemical Exports

There was a sharp fall in exports of pharmaceutical chemicals from Western Germany during the first six months of this year. Value of these exports, according to a report of the Association of Chemical Manufacturers was- DM. 74,000,000 (£6,300,000) comparedwith DM. 90,000,000 (£7,700,000) in the corresponding period of 1951. Deliveries to non-European countries, with the exception of Africa, were all heavily affected.

Turkish Plastics?

It is officially reported that five foreign manufacturing firms have made important offers to the Ministry of Commerce regarding the establishment of plants in Turkey for the manufacture of plastics. The Ministry is at present studying the offers in view of the fact that the consumption of plastic products in Turkey has increased considerably during the past few years. In 1951 Turkey spent 1,445,000 liras worth of foreign exchange purchasing plastics and plastics goods.

1953 International Congress

The XIIIth International Congress of Pure and Applied Chemistry will be held in Uppsala and Stockholm, Sweden, from 29 July to 7 August, 1953, it is reported. The Congress will be held in conjunction with the XVIIth Conference of the International Union of Pure and Applied Chemistry which meets every two years, and will comprise a physical chemistry section and a section on the chemistry of wood and wood constituents. Although last year's meeting of the Congress in New York embraced the whole field of chemistry, programmes of future congresses will only cover limited fields, as it is hard to accommodate very large conferences.

Refinery for Kenya

The Colonial Office has confirmed that the Shell Group is the undertaking which has been reported to be interested in the proposal to erect a £40,000,000 oil refinery near Mombasa in Kenya. It was stated that plans for the project were now being discussed between the Kenya Government and company representatives.

Costa Rica Fluoridates Water

Believed to be the first Latin American city to do so, San Jose, the capital of Costa Rica, population 80,000, has decided to install a water fluoridation system for its public water supplies. The money for the installation is coming partly from the U.S.A. under Point Four aid (assistance to underdeveloped countries), which is contributing 30 per cent of the cost, and partly from Costa Rica, which is contributing 70 per cent. Technical assistance will come under the Point Four programme as well.

Israel Sponsors Fair

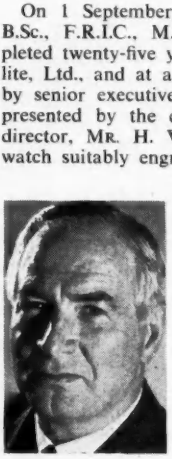
The Israeli Government is sponsoring an International Exhibition and Fair—the first of its kind—to be held in Jerusalem from 16 April to 18 May, 1953. It is to be devoted to the 'Conquest of the Desert,' and aims to present a survey of new methods of land reclamation, apparatus and procedures used in irrigation, soil conservation, agricultural colonisation, town planning and scientific research. UNESCO and other international bodies, as well as various Governments, national institutions and firms, are expected to participate.

Rare Chemicals Wanted

The National Registry of Rare Chemicals, Armour Research Foundation, Illinois Institute of Technology, Chicago, Ill., is interested in locating sources of supply for the following chemicals: tungsten disulphide; trimethylborine; potassium perselenate; calcium thiomalate; triethyl bismuth dibromide; 1,11-undecanedioic acid; ceryl alcohol; iododichlorophosphine; cyclohexylphenyl ketone; 2,5-xylyl hydrazine; lysergic acid; sphingosine; pyrithiamine; secretin; phytase; pitessine; oxyindol; coronene; N-methyl neosynephrine; *d*-threitol; coproporphyrin III.

PERSONAL

On 1 September MR. G. DRING, M.A., B.Sc., F.R.I.C., M.I.Chem.E., F.P.I., completed twenty-five years' service with Bakelite, Ltd., and at a private lunch, attended by senior executives of the company, was presented by the chairman and managing director, MR. H. V. POTTER, with a gold watch suitably engraved.



G. Dring

Mr. Dring's first experience in the plastics industry was in 1921, when, after taking an Honours Degree in chemistry at Trinity College, Cambridge, he joined the Damard Lacquer Company as research chemist. Two years later he went to Manchester with the Bradford Dyers' Association, and returned to the plastics industry in 1927 following the amalgamation of the Damard Lacquer Company and Mouldensite, Ltd., to form Bakelite, Ltd. He was made a director of the company in 1942, and still holds today the post of research and development director.

Mr. Dring has taken an active part and has held many official posts in scientific and technical societies connected with the plastics industry. He is a vice-president of the Plastics Institute, and chairman of the Plastics Industry Committee of the British Standards Institution.

It was announced last week that MR. GEORGE NOBLE, O.B.E., has relinquished his post as manager of the £37,500,000 Esso refinery at Fawley to become general manager of refining at the head office of the Esso Petroleum Co., Ltd., in London. Mr. Noble will be responsible for all the company's manufacturing operations and personnel. For the past 20 years he has held responsible positions in the industry, including those of assistant process manager and assistant maintenance superintendent at the Sarnia refinery of the Imperial Oil Co. of Canada. At the Esso refinery he was successively superintendent of technical services, assistant refinery superintendent and refinery general superintendent before he became refinery manager.

Successor to Mr. Noble as refinery manager is DR. FRANK MAYO, formerly assistant refinery manager in charge of refinery operations. He has been concerned with the refining side of the industry for 17 years, advancing from plant chemist in the original Esso refinery to the posts of superintendent technical services, process superintendent and assistant general superintendent.

MR. D. A. C. DEWDNEY is relinquishing his post as co-ordinator of refinery operation to become assistant refinery manager. His association with the Esso organisation dates from 1936, when he joined the International Association (Petroleum Industry), Ltd., after several years as a refinery chemist in the Middle East. From 1949 till his appointment in 1951 as co-ordinator of refinery operations he was research manager of the Esso Development Co.

Obituary

ALD. G. E. MARLOW, a former Lord Mayor of Sheffield, died on 5 September, aged 66, after several months' illness. Chairman of W. Marlow & Sons, Ltd., a firm of building contractors founded by his father, he was a director of The Ketton Portland Cement Co., Ltd., and Ribblesdale Cement, Ltd., both of which are in close association with Thos. W. Ward, Ltd., Sheffield.

Petrochemicals Production

Crude chemical production from petroleum and natural gas in the United States in 1951 reached a new high of 8,505,000,000 lb. compared with 6,935,000,000 lb. in 1950. Included in these figures are aromatics and naphthenes and aliphatic hydrocarbons, benzene, toluene, xylene, cresylic acid, naphthenic acid, ethane and ethylene, propane, and butadiene. Sales of these products in 1951 totalled 5,150,000,000 lb. valued at $287,000,000, compared with 4,057,000,000 lb. valued at $114,000,000 in 1950.

Publications & Announcements

NEW overseas distributors for the distribution of Stanton Products in India and the U.S.A. have recently been announced by the firm. These sole distributors are: Burrell Corporation, 2223 Fifth Avenue, Pittsburgh 19, Pa.; and Martin and Harris, Ltd., Savoy Chambers, Wallace Street, Fort, Bombay. They will carry a representative stock of the balances which are most in demand, and will also provide technical facilities and service through their technical staffs.

* * *

J. H. SANKEY & Son, Ltd., announce that they are putting on the market an entirely new Sankey product—a vitrified buff tile. This is designed to augment the company's present vitrified blue acid- and alkali-resisting bricks and tiles, but in a lighter colour. The buff colour is designed for use where its light-reflection will be of value—as in flooring surfaces for laboratories, chemical and food factories, and so forth. It can also be used for lining acid and other storage tanks. The surface is non-slippery and permanently withstands water, acids and alkalies. Two thicknesses of tile are supplied, $\frac{3}{4}$ in. and $1\frac{1}{2}$ in. Further details may be obtained from the company at their works at Ilford, Essex, or their head office at Aldwych House, Aldwych, W.C.2.

* * *

'FULLERS' Earth' is a term which is apt to be used far too loosely in technical literature, sometimes, indeed, to cover materials which do not possess its special properties. In order to explain adequately the properties of true fullers' earth (calcium montmorillonite) and the main applications of fullers' earth products, the Fullers' Earth Union, Ltd., has issued a new loose-leaf folder containing a set of six brochures. The first forms a general introduction to the subject. The remainder comprise a series of notes on: natural and activated fullers' earths for animal and vegetable oils, fats and waxes; activated fullers' earths for mineral oils and waxes; activated fullers' earths for regenerating used mineral oils; 'Fulbonds' to suit widely differing foundry practices; and 'Fulbent' in its wide use of applications including suspending, emulsifying and bonding, sprays and insecticides, ceramics, and in the rubber industry.

LATEST publication issued by the British Welding Research Association is a 'Memorandum on Non-destructive Methods for the Examination of Welds' (T.29). The booklet outlines the non-destructive methods available for the examination of welds and welded constructions. It has been prepared as an introduction to the subject in order to provide some guidance for engineers and inspectors who may be unfamiliar with the advantages and the limitations of the various methods. Emphasis has been made therefore, to the scope of application of each method in the field of welding fabrication and only brief accounts are given of the different examination techniques and the apparatus required. The booklet is available from the Association at 29 Park Crescent, London, W.1. Price 5s. post free.

* * *

HILGER & WATTS, Ltd. (Hilger Division) have brought out two publications which describe their new 'Biochem' absorptiometer and their H800 recording infra-red spectrometer with balanced optical system and pen recorder. The first is of compact design for use in laboratory, clinic and hospital. Convenient reading is provided by the use of a reflecting galvanometer, which projects a brilliant light spot with a hair line index on to an opaque screen. This gives a wider angle of vision than the conventional translucent screen. There is a full set of eight spectrum filters in the normal filter disc, which gives close discrimination of bands and more linear calibration than with broad band filters. The mount for test tubes is optically compensated, so that readings are not affected by the refractive index of solutions.

The spectrometer H800 marketed by the company incorporates a double-beam-in-time system and pen recorder. The former principle is the feeding of radiation from the measurement and comparison beams alternately to the thermopile and amplifier circuit. A shutter device in the comparison beam operates automatically to compensate any difference in the energy in the two beams, and its position is recorded on a pen recorder. This system is very much less elaborate and requires less attention than the dual D.C. amplifiers employed with double-beam-in-space instruments.

RECENTLY published is the 1950 Report of the Smithsonian Institution of Washington. This contains not only a report of the business of the Institution during the year, but a series of highly interesting and readable articles by experts in their own field. The object of this appendix, according to a note at the beginning, is to furnish brief accounts of scientific discovery in particular directions; reports of investigations made by staff members and collaborators of the Institution; and memoirs of a general character or on special topics that are of interest or value to the numerous correspondents of the Institution. Notable among the papers in this section of the report are 'Chemical achievement and hope for the future,' by Linus Pauling (California Institute of Technology); 'What is an elementary particle?' by E. Schrodinger (Dublin Institute for Advanced Studies)—reprinted from *Endeavour*; 'Beyond the milky way,' by Thornton Page (Yerkes Observatory, U.S.A.); 'The composition of our universe,' by Harrison Brown (Institute for Nuclear Studies, University of Chicago); and 'The luminous surface and atmosphere of the sun,' by Bertil Lindblad (Director, Stockholm Observatory). The Report may be obtained from the Superintendent of Documents U.S. Government Printing Office, Washington 25, D.C. Price $3 cloth.

* * *

SAVING of some 29 tons of coal a week was effected as the result of a simple improvement to shell-type boilers by work carried out jointly by the British Coal Utilisation Research Association and one of its member firms (I.C.I., Ltd.). The device is described and illustrated by diagrams in the *BCURA Quarterly Gazette* (No. 15) just issued. Other features include studies in dust assessment in the field and laboratory, and an article on coal structure and X-ray scattering.

* * *

'TAPE Digest' is the title of a technical guide for those interested in the use of all forms of tape for general and export packing and wherever precise standards and specifications are essential. Issued by John Gosheron & Co., Ltd., London, the digest lists five different classes of tape-filmic, cloth, paper, gummed paper, and weftless cotton. These are sub-divided into various types giving their composition, properties, and general uses.

'MODERN TEXTILE AUXILIARIES,' edited by A. J. Hall, B.Sc., F.R.I.C., F.T.I., and recently published by Thomas Skinner and Company, of Manchester (pp. 186, 21s.), is a compilation of some 1,500 modern textile auxiliaries for use as a book of reference in the textile and related industries. The commercial names under which these auxiliaries are marketed are frequently varied and give little indication of their particular uses or their chemical nature. This book gives descriptions of chemical and physical properties and the uses of the various products, as well as giving the literature references to each product for further study if required. The name of the company marketing each one is given, and a glance through the book shows the field covered to be an international one. So much so, in fact, that there are more German and American auxiliaries listed than British ones. This book should be very useful as a work of reference. It contains an index of products, manufacturers, and trade names.

* * *

W. J. EDWARDS and Company (London), Ltd., announce that they have produced several new leaflets dealing with apparatus manufactured by the firm. All are to do with vacuum equipment. They concern a piston compressor and vacuum pump; vacuum pipe line units; vacuum pumping units; 'Circseal' range of precision ground glass joints; and 'Speedivac' educational equipment. The latter allows 20 simple classroom experiments in physics to be demonstrated.

* * *

THE current issue of the *Sulzer Technical Review* contains a 13-page illustrated article on the subject of material problems in chemical process equipment. After giving a brief account of the development of this branch of engineering and particularly of high-pressure applications the author, Dr. L. Piatti, goes on to examine the causes of corrosion and its prevention by the appropriate choice of materials. The trend, he states, is in the direction of the use of pure rather than plated metals and tantalum and titanium are mentioned. The use of such organic materials as 'Teflon,' 'Delanium' and 'Durabon' is discussed. Copies of the *Review* can be obtained from Sulzer Bros. (London), Ltd., 31 Bedford Square, London, W.C.1.

Law & Company News

The following are taken from the printed reports, but we cannot be responsible for errors that may occur

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

BOSELEY INSTRUMENTS, LTD., Eastwood (Essex). (M., 13/9/52). 8 August, assignment securing to Lloyds Bank, Ltd., £400 not ex.; charged on certain contract moneys.

PETROCHEMICALS, LTD., London, W. (M., 13/9/52). 7 August, mortgage, supplemental to a Trust Deed dated 17 May, 1949, a mortgage, supplemental to a Trust Deed dated 30 December, 1949, and a mortgage supplemental to a Trust Deed date 27 April, 1951; charged on specified shares. *£7,650,000. 13 March, 1952.

Increases of Capital

The following increases of capital have been announced: ETHICON SUTURE LABORATORIES, LTD., from £20,000 to £40,000; WESTERN PHARMACEUTICALS, LTD., from £1,000 to £6,000; ROUSSEL LABORATORIES, LTD., from £2,000 to £30,000.

Satisfaction

DEXTRAN, LTD., Aycliffe, manufacturers of plasma substitute, etc. (M., 13/9/52). Satisfaction, 20 August, £18,500 registered 8 August, 1950.

New Registrations

Bermondsey Metals & Chemicals, Ltd.

Private company. (511,166). Capital £500. Manufacturers of metals, chemicals, machinery, etc. Directors: H. Wright and E. G. Dadak. Reg. office: 13/14 St. Andrews House, Holborn Circus, E.C.1.

Soil Colloids, Ltd.

Private company. (511,196). Capital £300. Manufacturing and research chemists, manufacturers of chemical and artificial manures and fertilisers, etc. Directors: B. H. Rotger and E. G. Finch. Reg. office: 83 Eastwood Road, Rayleigh, Essex.

Company News

Burt Boulton & Haywood, Ltd.

Net profit of Burt Boulton & Haywood, Ltd., timber merchants and chemical manufacturers, for the year ended 31 March, 1952, amounted to £160,262 compared with £94,137 in the previous 12 months. In connection with the issue of £400,000 5½ per cent Unsecured Loan Stock details of which were recently issued, the directors have now announced that in present conditions it is not considered possible to give a reliable estimate of the profits for the year ending 31 March, 1953, but it is likely to be substantially less than those of the previous year. The profit record of the company is sufficiently good, however, for this not to deter shareholders from subscribing to the issue.

Powell Duffryn, Ltd.

Widespread activities of Powell Duffryn, Ltd., in many parts of the world are surveyed by the chairman, Sir Herbert Merrett in his statement which accompanies the report for the year ended 31 March, 1952, to be presented at the company's annual general meeting at the May Fair Hotel, London, W.1, on 24 September. Sir William, while expressing confidence in the future, deplores the present high level of taxation, for upon the measure of confidence and security which can be offered to the investor must depend industry's ability to attract the additional capital necessary to meet the ever-increasing cost of replacement of assets and additions thereto. A final dividend of 5 per cent (less tax) on ordinary stock is recommended, making with the interim dividend of 3 per cent paid in February, a total of 8 per cent for the year.

A. J. White, Ltd.

Group balances of A. J. White, Ltd. for the year ended 31 March, carried forward £144,034 (£129,290). Directors propose an increase of capital from £400,000 to £500,000 by the creation of 200,000 ordinary shares at 10s. each. This is to provide additional finance on a permanent basis as borrowing of a temporary nature has had to be resorted to. Stockholders are warned by the chairman, Mr. C. L. Fowell, that in future payment of interim dividends will be postponed until the beginning of March.

Licensing Proposals

U.S. Firms Seek European Contracts

FIFTY new licensing proposals for the foreign manufacture of American products have been announced by the Mutual Security Agency Mission to the United Kingdom and included in the list are nine of interest to the chemical industry. Four of these come from firms of consultants.

Negotiations Private

The MSA licensing programme helps establish contacts between European and American firms interested in entering into licensing or partnership arrangements for their mutual benefit. The firms themselves carry on subsequent negotiations through ordinary business procedures. In the United Kingdom officers of the Associated British Chamber of Commerce, the Federation of British Industries, the Scottish Council (Development and Industry) and the Ministry of Commerce, Northern Ireland, are acting as Field Counsellers.

The lastest American proposals include the following:—

No. 230: The Air-O-Fan Products Corporation of Gilroy, California, is interested in contacting European manufacturers who would like to be licensed for the production of their agricultural spray rigs, dusters and dehydrator fans.

No. 232: J Ashton Green & Associates of Baton Rouge, Louisiana, offer their services in all phases of the petroleum, natural gas and petrochemical industries.

No. 235: The Baltimore Paint & Colour Works of Baltimore, Maryland, wish to license the manufacture of their patented products in Europe and would like to be licensed for the production of European paints and similar products in the United States.

Glass Treatment

No. 239: The Calumite Company of Hamilton, Ohio, are interested in licensing their technique of glass treatment.

No. 240: The Centro Research Laboratories, Inc., of New York City, offer their technical knowledge to European manufacturers in the chemicals, paints, and rubber-base finishes fields.

No. 241: The Chemit Company of Brooklyn, New York, offer their consulting services to chemical manufacturers.

No. 261: The Nox-Rust Chemical Corporation of Chicago, Illinois, is interested in contacting European manufacturers who would like to produce its Nox-Rust Vapor Wrapping for use in protecting machinery during storage.

No. 262: Petroleum Technologists, Inc., of Montebello, California, offer their services as petroleum production consultants.

No. 268: The Samuel Smidt Chemical Corporation of Peabody, Massachusetts, wishes to license the manufacture of its leather finishes and latex-type paints.

Market Reports

LONDON.—There have been no outstanding price movements on the industrial chemicals market and quotations are steady at recent levels. The movement of supplies to the textile industry is understood to be a little better and a fair volume of general export inquiry is reported. A steady routine demand is reported for the potash chemicals and the soda compounds while a fair interest is maintained in the lead and oxides and lithopone.

In most sections of the coal tar products market quiet conditions remain with the pyridines, crude tar and refined tar being in fairly good demand. Export inquiries are on a moderate scale.

MANCHESTER.—Quotation for the general run of heavy chemicals on the Manchester market during the past week have been maintained and only in one or two sections is there any sign of easiness developing. Solid and liquid caustic soda and most other alkalis are being called for in reasonably good quantities against contracts and a fair trade is being done in the ammonia potash and magnesia compounds. Shipping business is keeping up with most of the leading markets. In basic slag and the compound fertilisers there is a quickening of buying interest, with a little more doing in other materials. From the point of view of new business the tar products market has been on the quiet side.

GLASGOW.—The past week has shown a marked increase in demand for the majority of industrial chemicals, both for spot and forward delivery. Inquiries for export have also been more numerous than of late, with a fair proportion of orders covered.

'Loading the Bandwagon'

UNDER this heading a light-hearted report of the Triplex organisation is given by the chairman and managing director, Sir Graham Cunningham, who this year presents his shareholders with their facts and figures in a novel form. Underlying the humorous text and accompanying drawings, however, is some sound thinking, and Sir Graham has some trenchant remarks to make about high taxation.

The report includes illustrations of the group's products, and a simplified and detailed version of the profit and loss accounts for the Year ended 30 June, 1952.

Included in the Triplex group of companies is Quickfit & Quartz, Ltd., manufacturers of scientific and industrial chemical glassware. The 31st annual general meeting of the company will be held at the Holborn Restaurant, London, W.C.1, on 24 September.

1953 Plastics Exhibition

The Second British Plastics Exhibition and Convention will be held at Olympia, London, from 3-13 June, 1953, opening on the day following the Coronation. The Exhibition will occupy the whole of the National Hall, Olympia. As a result of the success of the first Exhibition in 1951 over 82 per cent of the space has already been applied for by 78 firms, including 28 suppliers of raw materials, 24 fabricators and moulders and 19 plant manufacturers.

Parke-Davis Deny Anaemia

The charge against chloromycetin that it has caused disorders in the blood-forming system and given rise to a type of anaemia in recent cases of treatment, has been challenger by Parke-Davis, makers of the drug. Any type of potent drug, say the company, *may* cause blood disorders. In the case of chloromycetin, however, cases showing evidence of blood disorders are less than 0.001 per cent of several millions treated, and these cases have not yet been proved to be caused by chloromycetin, as in many cases other treatments and drugs were also used. The Food and Drug Administration of the U.S. and the company itself are both checking up on all cases of reported side reactions.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

ASSISTANT ENGINEER required by Chemical Engineering Firm in London. Qualifications required are: Age about 30: B.Sc. Engineering: above average knowledge of Physics and Thermodynamics essential: good Mathematics: understanding of Chemistry desirable: practical works experience essential: understanding of general office procedure and technical sales an advantage. The position offers excellent opportunities to a man having these qualifications coupled with a keen business outlook. Write, stating age, qualifications, salary required, to **BOX No. C.A. 3165,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMIST. The Midland Tar Distillers, Ltd., Oldbury, near Birmingham, have a vacancy in their Research Department for a chemist, aged 23/35 years, with Degree or A.R.I.C. and preferably some industrial experience, for technical service and development work on coal tar products. Experience in organic or inorganic analysis or in the treatment of effluents would be an asset. Please reply to Personnel Manager.

HER MAJESTY'S COLONIAL RESEARCH SERVICE EAST AFRICA HIGH COMMISSION

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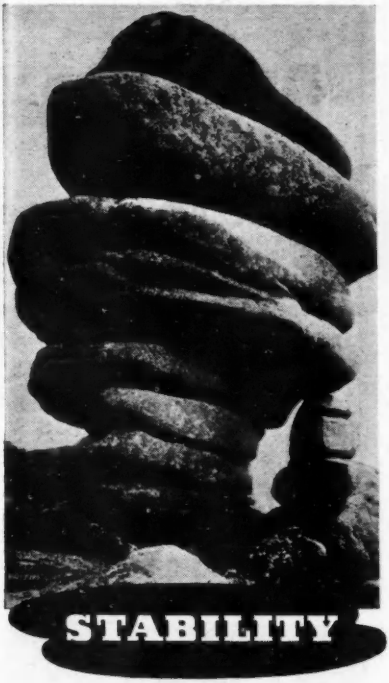

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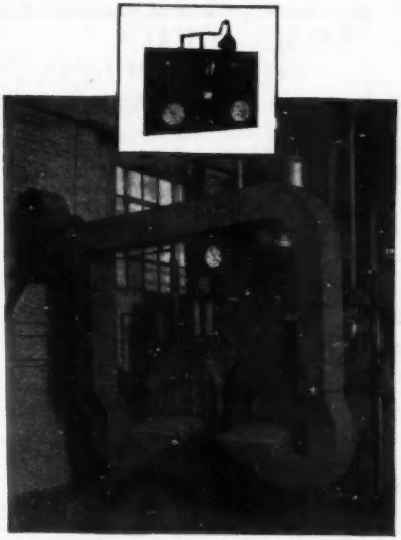

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